RS-232 56K
Ext Modem

User Manual

Content

1. Introduction 3

2. Features 4

3. Installation 5

3.2.1 Installation Procedures for Windows 64-bits (XP/Win7/Vista) 6

3.2.2 Installation Procedures for Windows 32-bits (XP/Win7/Vista) 10

4. Commands 11

4.1 Typing Commands 11

4.2 AT Commands 11

4.3 S-Register Definitions 13

1. Introduction

The Voice/Fax/Data Modem connects your computer to Internet, and all kinds of BBS, and other popular Fax / Modems. This manual describes the features, procedures of installations, and AT command set...etc. of this modem.

Indicators

POWER: Power on indicator.
DATA: DTR signal indicator.
OH: Off Hook.

Rear Panel

PHONE: Phone jack.
LINE: Telephone line jack.
RS-232: RS232 cable socket.
POWER: AC adapter input.
ON/OFF: Power switch

2. Features

Data

* ITU-T V.92(lite), ITU-T V.90

* ITU-T V.34, V.32bis, V.32, V.22bis, V.22

* Bell 103 & 212A

* V.44, V.42bis & MNP 5 (Data compression)

* V.42 & MNP2-4 (Error correction)

Fax

* V.17 (14400bps FAX)

* V.29 (9600bps FAX)

* V.27ter (4800bps FAX)

* Class 1

Voice

* Voice/Audio mode

* Full-Duplex speakerphone(optional)

Package Checklist

* One fax modem

* One piece of phone cable

* One piece of RS-232 cable

* One CD

* One Adapter

If any of these items are missing or damaged, please

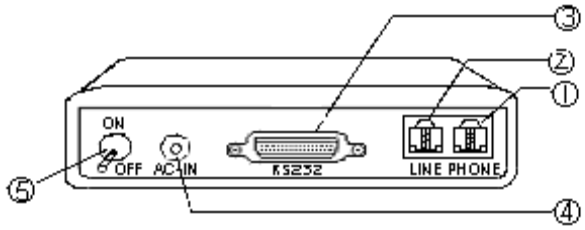
contact your dealer or sales representative for assistance.

3. Installation

3.1 Hardware Installation

**Do not power on your modem before your finished

the following installation.



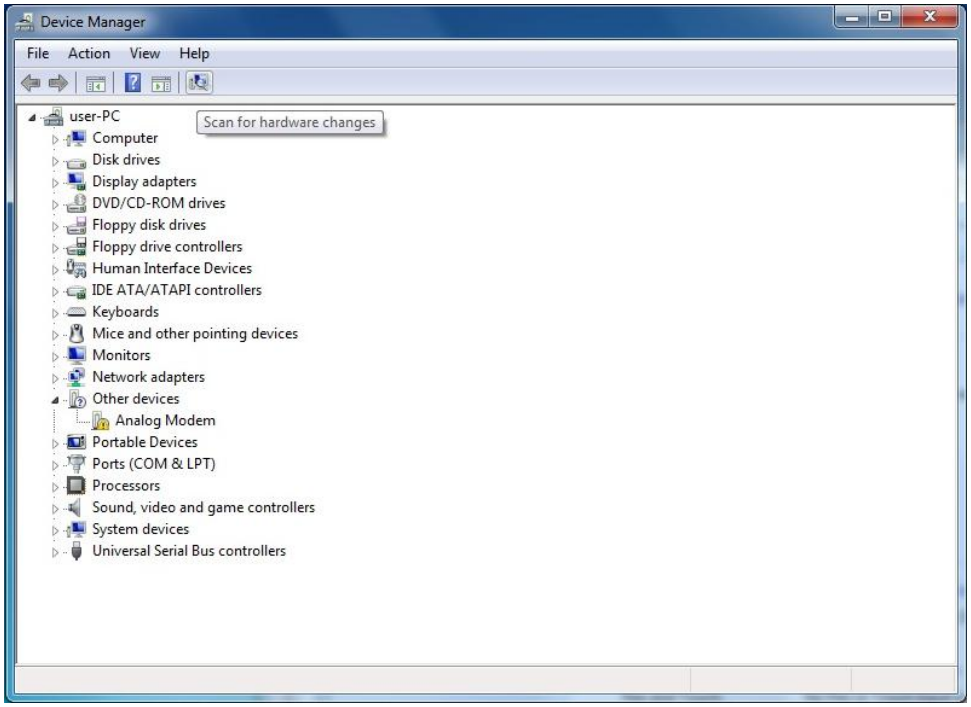
1. Plug the male end of the RS-232 cable into the connector marked RS-232 ③ on the back of the modem.
2. Plug the other end of this cable into the serial port on the back of your computer.
3. Plug the power cable into the AC-IN(or POWER) connector ④ on the back of the modem.
4. Plug the power adapter into a wall outlet.
5. Plug one end of the phone cable into the modem LINE jack ②. Plug the other end into the phone outlet.
6. To use telephone and the modem on the same line, plug one end of the optional phone cable into the PHONE jack ① on the modem; plug the other end into the phone. Lift the telephone handset and listen for a DIALTONE to check the connection.
7. Turn your modem on ⑤ . The POWER lights should light up.
8. Turn your computer on.

3.2 Driver Installation

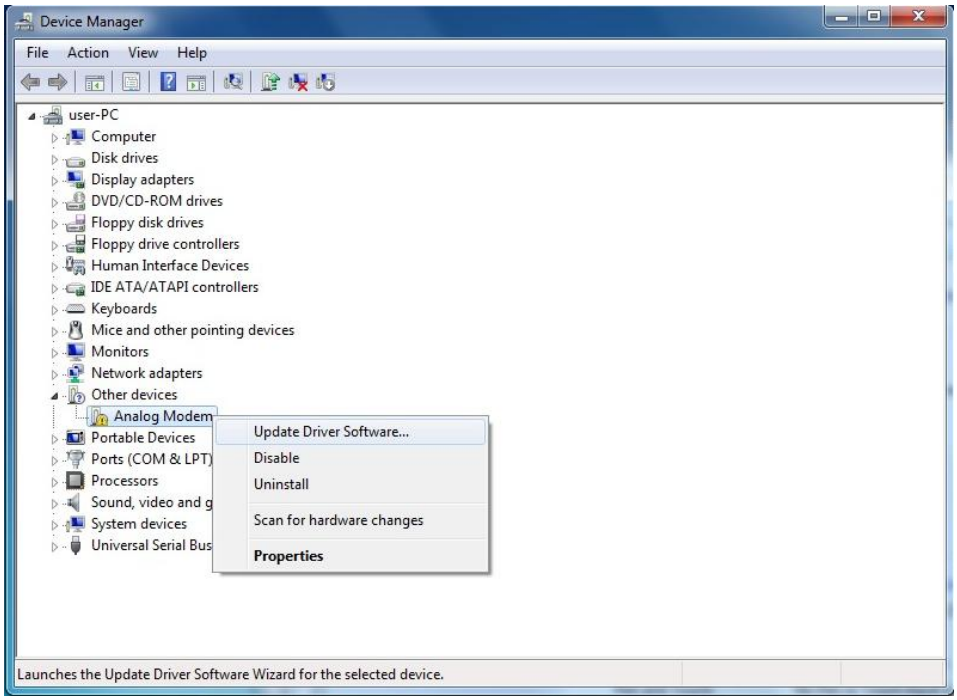
3.2.1 Installation Procedures for Windows 64-bits (XP/Win7/Vista)

If your computer is using Windows 64-bits (XP/Win7/Vista), please open and browse the related folder of CD. e.g. F:\Driver\Win7_64. There is a .INF file in the related folder for installation. You may refer to these following steps to install.

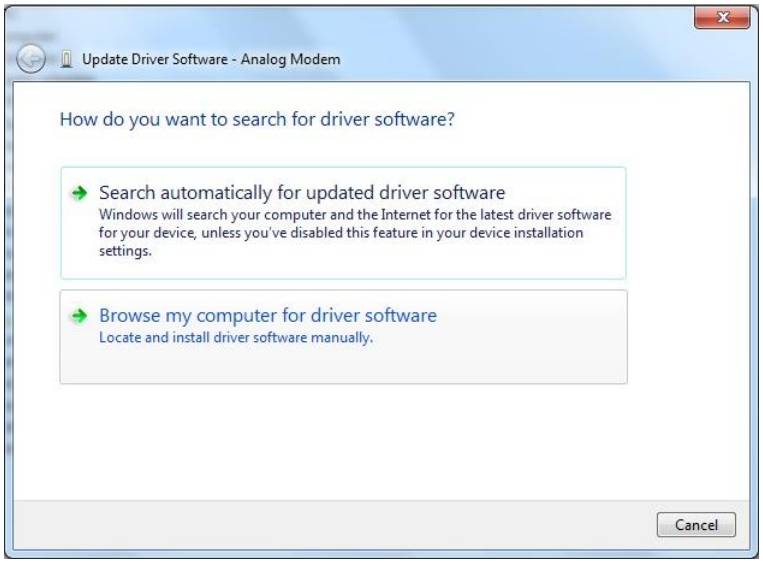
1. After Hardware Installation, switch on your computer and insert the driver CD into the CD-ROM. Open Device Manager of Windows. Click and run “Scan for hardware changes”.



2. The Device Manager will show a unknown device, such as Analog Modem. Move your mouse on this unknown device and click right key of mouse, and select **Update Driver Software**.



3. Select **Browse my computer for driver software**.


Update Driver Software - Analog Modem
How do you want to search for driver software?
Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.
Browse my computer for driver software
Locate and install driver software manually.
Cancel

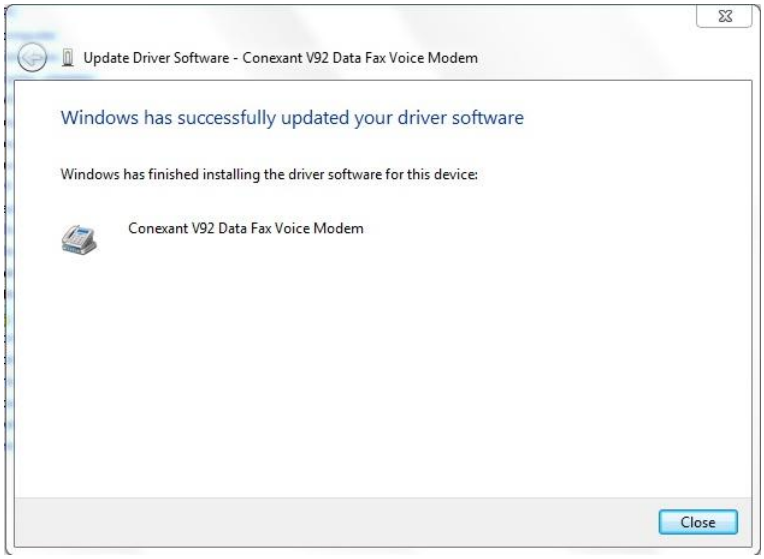
4. Click Browse and open the driver files. e.g., F:\Driver\Win7_64.

Update Driver Software - Analog Modem
Browse for driver software on your computer
Search for driver software in this location:
F:\DriverWIN7_64
Browse...
Include subfolders
Let me pick from a list of device drivers on my computer
This list will show installed driver software compatible with the device, and all driver software in the same category as the device.
Next
Cancel

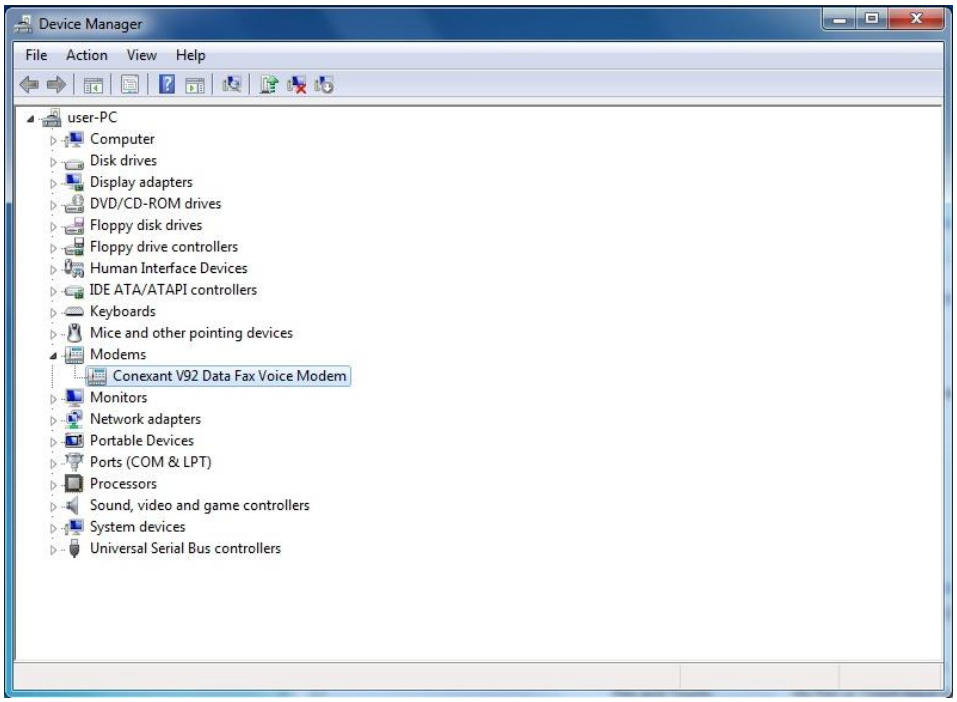
5. If windows pop out a warring message. Select **Install this driver software anyway** and continue to install.

Windows Security
Windows can't verify the publisher of this driver software
Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.
Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.
See details

6. Click **Close** to complete the installation.


Update Driver Software - Conexant V92 Data Fax Voice Modem
Windows has successfully updated your driver software
Windows has finished installing the driver software for this device:
Conexant V92 Data Fax Voice Modem
Close

7. When completed installation, the modem displayed in Device Manager.



3.2.2 Installation Procedures for Windows 32-bits (XP/Win7/Vista)

If your computer using Windows 32-bits (2K/XP/Win7/Vista), please open the related folder of CD. e.g., F:\Driver\Win2K_XP. There is a Setup.exe file in the related folder for installation. You may use the Wizard of installation CD to install.

4. Commands

Most people use the communication software programs to tell modems what to do. Therefore, you may not use the commands in this chapter. However, if you prefer to communicate with your modem directly, you can type the commands described below.

4.1 Typing Commands

* Use the BACKSPACE key to delete typing errors.
* Every command (except **A/** and +++) must begin with the **AT** or **at** prefix and be entered by pressing the <Enter> key. For example, to execute the **V** command, you would type **ATV** and press the <Enter> key.
* When you see an ***n***, replace the ***n*** with one of the letter or numeric options listed for that command. For example, for the ***En*** command, you might type **ATE1**.
*All defaults are based on the **&F** Hardware Flow Control template load in **NVRAM** when the modem is shipped.

4.2 AT Commands

A / Re-executes the last issued command. Used mainly to redial.

A Go off-hook and attempt to answer a call.

D*n* **Dial**

0-9 DTMF digits 0 to 9

P Pulse (rotary) dial

T Tone dial

W Wait for second dial tone (X3 or higher); linked to S6 register.

^ Toggles calling tone enable/disable.

E*n* **Command Echo**

E0 Disable command echo

E1 Enable command echo

H*n* **Disconnect (Hang-up)**

H0 Hang up (goes on-hook)

H1 Go off-hook

I*n* **Identification**

I 0 Report product code

I 2 Report “OK” or “ERROR”

I3 Report firmware revision

I4 Report OEM defined identifier string

I6 Report modem data pump model and internal code revision

M*n* **Speaker Control**

M0 Speaker is always off

M1 Speaker ON until CONNECT

M2 Speaker is always on.

M3 Speaker off during dialing and receiving carrier and turn speaker on during answering.

O*n* **Return to On-Line Data Mode**

O0 Go on-line

O1 Go on-line and retrain

P **Set Pulse Dial**

(for phone line that does not support touchtone dialing)

Z*n* **Soft Reset and Restore Profile**

Z0 Restore stored profile 0 after warm reset.

Z1 Restore stored profile 1 after warm reset.

&C*n* **Control Carrier Detect (CD)Signal**

&C0 CD override

&C1 Normal CD operations

&D*n* **DTR Option**

&D0 Ignore an on-to-off transition of DTR.

&D1 Switch to on-line command mode without disconnection.

&D2 Normal DTR operations.

&D3 Modem re-initialized. &Y determines which profile is loaded.

&F*n* **Load Factory Configuration (Profile)**

&W*n* **Store Current Configuration**

&W0 Store the current configuration as profile 0.

&W1 Store the current configuration as profile 1

.

4.3 S-Register Definitions

ATS? Read Selected S-Register.

This command reads and displays the selected S-Register. An S-Register can be selected by using the **ATS*n*** command.

S*r*=n Set Register *r* to *n*

S0 Number of Rings to Auto-Answer

The number of rings the modem waits for before it auto answers.

Range: 0-255 (rings)

Default: 0 (Country dependent)

S6 Wait Time before Blind Dialing

The time to pause after off-hook before blind dialing.

Range: 2-255 (rings)

Default: 2 (Seconds, Country dependent)

S7 Wait Time before Carrier Detect

The time to wait for a carrier from the remote modem before hanging up.

Range: 1-255

Default: 50 (Seconds, Country dependent)

S8 Pause Time For Dial Delay

The time to pause for the pause dial modifier, “Comma”.

Range: 2-255

Default: 2 (Seconds, Country dependent)

S9 Carrier Detect Response Time

The time a signal is detected an qualified as a carrier. This timing lets your modem ignore spurious signals that are the same frequency as the carrier. Higher S9 values reduce the

Range: 1-255 6 tenths of a second

Default: 6 (0.6 seconds)

S10 Lost Carrier To Hang Up Delay

The time the modem waits before hanging up for carrier loss.

Range: 1-255 tenths of a second

Default: 14 (1.6 seconds)

S11 DTMF Tone Duration

The time for DTMF tone diali b ng and the time between the tone spacing.

Range: 50-255

Default: 95(95 ms, country dependet)

AT Commands for CX81801 SmartV.XX, CX06833 SMXXD, CX81300 SmartACF, and CX06827 SCXXD Modems

Reference Manual

Doc. No. 102184B
July 1, 2003

CONEXANT®

Revision Record

Revision	Date	Comments
B	7/1/2003	Rev. B release.
A	5/23/2003	Initial release.

© 2003 Conexant Systems, Inc.
All Rights Reserved.

Information in this document is provided in connection with Conexant Systems, Inc. (“Conexant”) products. These materials are provided by Conexant as a service to its customers and may be used for informational purposes only. Conexant assumes no responsibility for errors or omissions in these materials. Conexant may make changes to specifications and product descriptions at any time, without notice. Conexant makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Conexant’s Terms and Conditions of Sale for such products, Conexant assumes no liability whatsoever.

THESE MATERIALS ARE PROVIDED “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF CONEXANT PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. CONEXANT FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. CONEXANT SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

Conexant products are not intended for use in medical, lifesaving or life sustaining applications. Conexant customers using or selling Conexant products for use in such applications do so at their own risk and agree to fully indemnify Conexant for any damages resulting from such improper use or sale.

The following are trademarks of Conexant Systems, Inc.: Conexant® and the Conexant C symbol, SmartDAA®, SmartSCM, SmartACF, and ConfigurACE. Product names or services listed in this publication are for identification purposes only, and may be trademarks of third parties. Third-party brands and names are the property of their respective owners.

For additional disclaimer information, please consult Conexant’s Legal Information posted at www.conexant.com, which is incorporated by reference.

Reader Response: Conexant strives to produce quality documentation and welcomes your feedback. Please send comments and suggestions to tech.pubs@conexant.com. For technical questions, contact your local Conexant sales office or field applications engineer.

Contents

Revision History xi
1 Introduction 1-1
1.1 Overview 1-1
1.1.1 Command Syntax 1-1
1.1.2 Command Descriptions 1-1
1.1.3 Call Progress and Blacklisting Parameters 1-1
1.1.4 ConfigurACE II for Windows Utility Program 1-2
1.2 Reference Documentation 1-2
2 Syntax and Procedures 2-1
2.1 Alphabet 2-1
2.2 DTE Commands Lines 2-1
2.2.1 Command Line General Format 2-1
2.2.2 Command Line Editing 2-2
2.2.3 Command Line Echo 2-2
2.2.4 Repeating a Command Line 2-2
2.2.5 Types of DTE Commands 2-2
2.3 Basic Syntax Commands 2-2
2.3.1 Basic Syntax Command Format 2-2
2.3.2 S-Parameters 2-3
2.4 Extended Syntax Commands 2-4
2.4.1 Command Naming Rules 2-4
2.4.2 Values 2-4
Numeric Constants 2-4
String Constants 2-5
Compound Values 2-5
2.4.3 Action Commands 2-5
Action Execution Command Syntax 2-5
Action Test Command Syntax 2-6
2.4.4 Parameter Commands 2-6
Parameter Types 2-6
Parameter Set Command Syntax 2-7
Parameter Read Command Syntax 2-7
Parameter Test Command Syntax 2-7
2.4.5 Additional Syntax Rules 2-7
Concatenating Commands after Extended Syntax Commands 2-7
Concatenating Commands after Basic Format Commands 2-8
2.5 Issuing Commands 2-8

2.6 Executing Commands ... 2-8
2.6.1 Aborting Commands ... 2-8
2.6.2 Handling of Invalid Numbers and S-Parameter Values ... 2-9
2.7 Modem Responses ... 2-9
2.7.1 Responses ... 2-9
2.7.2 Extended Syntax Result Codes ... 2-10
2.7.3 +<name>: <compound_value>Information Text Formats for Test Commands ... 2-11
Range of Values ... 2-11
Compound Range of Values ... 2-11
3 Data Command Set ... 3-1
3.1 Command Guidelines ... 3-1
3.1.1 Escape Code Sequence ... 3-1
3.2 Data Commands ... 3-1
3.2.1 Generic Modem Control ... 3-2
Z - Soft Reset and Restore Profile ... 3-2
+FCLASS - Select Active Service Class ... 3-2
+VCID - Caller ID (CID) ... 3-3
+VRID - Report Retrieved Caller ID (CID) ... 3-4
\N - Operating Mode ... 3-5
I - Identification ... 3-6
+GMI - Request Manufacturer Identification ... 3-7
+GMI9 - Request Conexant Identification ... 3-7
+GMM - Request Model Identification ... 3-8
+GMR - Request Revision Identification ... 3-8
+GCAP - Request Complete Capabilities List ... 3-8
+GCI - Country of Installation ... 3-9
&F - Restore Factory Configuration (Profile) ... 3-10
&T - Local Analog Loopback Test ... 3-10
&Y - Designate a Default Reset Profile ... 3-11
&W - Store Current Configuration ... 3-11
&Zn=x - Store Telephone Number ... 3-12
%7 - Plug and Play Serial Number ... 3-12
%8 - Plug and Play Vendor ID and Product Number ... 3-13
**- Load Flash Memory ... 3-14
3.2.2 DTE-Modem Interface commands ... 3-17
E - Command Echo ... 3-17
Q - Quiet Results Codes Control ... 3-17
V - Result Code Form ... 3-18
W - Connect Message Control ... 3-18
X - Extended Result Codes ... 3-19
&C - RLSD (DCD) Option ... 3-24
&D - DTR Option ... 3-24
&K - Flow Control ... 3-25
&M - Asynchronous/Synchronous Mode Selection ... 3-26
&Q - Sync/Async Mode ... 3-27
&R - RTS/CTS Option ... 3-28

&S - DSR Override 3-28
&X - Select Synchronous Clock Source 3-29
+IPR - Fixed DTE Rate 3-30
+IFC - DTE-Modem Local Flow Control 3-31
+ILRR - DTE-Modem Local Rate Reporting 3-32
+IBC – In Band Commands 3-34
3.2.3 Call Control 3-37
D - Dial 3-37
T - Set Tone Dial Default 3-40
P - Set Pulse Dial Default 3-40
A - Answer 3-40
H - Disconnect (Hang-Up) 3-41
O - Return to On-Line Data Mode 3-42
L - Speaker Volume 3-43
M - Speaker Control 3-43
&G - Select Guard Tone 3-44
&P - Select Pulse Dial Make/Break Ratio 3-44
&V - Display Current Configuration and Stored Profiles 3-45
&V1 - Display Last Connection Statistics 3-46
\V - Single Line Connect Message Enable 3-47
%L - Report Line Signal Level 3-48
%Q - Report Line Signal Quality 3-48
*B - Display Blacklisted Numbers 3-48
*D - Display Delayed Numbers 3-49
–PPD= - Extension Pickup Notification through 16550 UART 3-49
–STE= - Set Telephony Extension 3-50
-TRV – Tip & Ring Voltage 3-55
-TTE - Threshold Adjustments for Telephony Extension 3-56
3.2.4 Modulation Control Commands 3-57
+MS - Modulation Selection 3-57
+MR - Modulation Reporting Control 3-59
%E - Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward 3-61
B - CCITT or Bell 3-62
3.2.5 Error Control Commands 3-63
+ES - Error Control and Synchronous Mode Selection 3-63
+EB - Break Handling in Error Control Operation 3-65
+ESR - Selective Repeat 3-65
+EFCS - 32-bit Frame Check Sequence 3-66
+ER - Error Control Reporting 3-67
+ETBM - Call Termination Buffer Management 3-69
\B - Transmit Break to Remote 3-70
\K - Break Control 3-71
-K - MNP Extended Services 3-72
3.2.6 Data Compression Commands 3-73
+DS - Data Compression 3-73
+DS44 - V.44 Compression Select 3-74

+DR - Data Compression Reporting 3-75
%C - Enable/Disable Data Compression 3-77
3.2.7 V.8/V.8bis Commands 3-78
+A8E - V.8 and V.8bis Operation Controls 3-78
+A8I: - CI Signal Indication 3-79
3.2.8 Synchronous Access Mode Commands 3-80
+ESA - Configure Synchronous Access Submode 3-80
+H - Enable/Disable RPI 3-82
+ITF - Transmit Flow Control Thresholds 3-83
3.2.9 Diagnostic Commands 3-84
#UD – Last Call Status Report 3-84
%TT - PTT Test Command 3-92
3.2.10 Compatibility Commands 3-93
&L - Leased Line Operation 3-93
)M - Enable Cellular Power Level Adjustment 3-93
@M - Initial Cellular Power Level Setting 3-94
:E - Compromise Equalizer Enable Command 3-94
3.2.11 Fast Connect Commands 3-95
$F – Fast Connect Control 3-95
3.2.12 V.92 +P and –Q Commands 3-96
+PCW - Call Waiting Enable 3-96
+PMH - Modem-on-Hold Enable 3-97
+PMHT – Modem-on-Hold Timer 3-98
+PMHR - Initiate Modem-on-Hold 3-99
+PIG - PCM Upstream Ignore 3-100
+PMHF - V.92 Modem-on-Hold Hook Flash 3-100
+PQC - V.92 Phase 1 and Phase 2 Control 3-101
+PSS - Use Short Sequence 3-102
-QCPC - Force Full Startup Procedure Next Connection 3-103
-QCPS - Enable Quick Connect Profile Save 3-103
3.3 S-Parameters 3-104
S - Read/Write S-Parameter 3-104
3.3.1 Factory Defaults 3-104
3.3.2 S-Parameter Definitions 3-106
S0 - Number of Rings to Auto-Answer 3-106
S1 - Ring Counter 3-106
S2 - Escape Character 3-106
S3 - Carriage Return Character 3-106
S4 - Line Feed Character 3-106
S5 - Backspace Character 3-107
S6 - Wait Time before Blind Dialing or for Dial Tone 3-107
S7 - Wait Time for Carrier, Silence, or Dial Tone 3-107
S8 - Pause Time For Dial Delay 3-108
S9 - Carrier Detect Response Time 3-108
S10 - Lost Carrier To Hang Up Delay 3-108
S11 - DTMF Tone Duration 3-108

S12 - Escape Prompt Delay (EPD) ... 3-109
S14 - General Bit Mapped Options Status ... 3-109
S16 - Test Mode Bit Mapped Options Status ... 3-109
S17 - Point Of Sale Options Selection ... 3-110
S19 - Reserved ... 3-111
S20 - Reserved ... 3-111
S21 - V.24/General Bit Mapped Options Status ... 3-112
S22 - Speaker/Results Bit Mapped Options Status ... 3-112
S23 - General Bit Mapped Options Status ... 3-113
S24 - Sleep Inactivity Timer ... 3-113
S25 - Delay To DTR Off ... 3-113
S26 - RTS to CTS Delay ... 3-113
S27 - Bit Mapped Options Status ... 3-114
S28 - Bit Mapped Options Status ... 3-114
S29 - Flash Dial Modifier Time ... 3-115
S30 - Disconnect Inactivity Timer ... 3-115
S31 - Bit Mapped Options Status ... 3-115
S36 - LAPM Failure Control ... 3-116
S38 - Delay Before Forced Hang Up ... 3-116
S39 - Flow Control Bit Mapped Options Status ... 3-117
S40 - General Bit Mapped Options Status ... 3-117
S41 - General Bit Mapped Options Status ... 3-118
S46 - Data Compression Control ... 3-118
S48 - V.42 Negotiation Control ... 3-118
S86 - Call Failure Reason Code ... 3-119
S91 - PSTN Transmit Attenuation Level ... 3-120
S92 - Fax Transmit Attenuation Level ... 3-120
S95 - Extended Result Codes Control ... 3-120
S210 – V.34 Symbol Rates ... 3-121

3.4 Result Codes ... 3-122

4 Fax Class 1 and Fax Class 1.0 Commands ... 4-1

4.1 Fax I/O Processing ... 4-1
4.1.1 DTE-to-Modem Transmit Data Stream ... 4-1
4.1.2 Modem-to-DTE Receive Data Stream ... 4-1
4.1.3 Fax Mode Selection ... 4-1
4.1.4 Fax Origination ... 4-3
4.1.5 Fax Answering ... 4-3
4.1.6 Fax Control Transmission ... 4-3
4.1.7 Fax Control Reception ... 4-3
4.1.8 Fax Data Transmission ... 4-4
4.1.9 Fax Data Reception ... 4-5
4.2 Commands and Parameters ... 4-6
4.2.1 Mode Entry Commands ... 4-6
+FCLASS=1 - Select Facsimile Class 1 Mode ... 4-6
+FCLASS=1.0 - Select Facsimile Class 1.0 Mode ... 4-6
4.2.2 Mode Commands ... 4-6

+FAA - Auto Answer Enable ... 4-6
+FAE - Auto Answer Enable ... 4-7
+FTS - Transmit Silence ... 4-7
+FRS - Receive Silence ... 4-8
+FTM - Transmit Facsimile ... 4-9
+FRM - Receive Facsimile ... 4-10
+FTH - Transmit Data with HDLC Framing ... 4-11
+FRH - Receive Data with HDLC Framing ... 4-12
4.2.3 Service Class 1 Parameters ... 4-13
+FAR - Adaptive Reception Control ... 4-13
+FCL - Carrier Loss Timeout ... 4-14
+FDD - Double Escape Character Replacement ... 4-15
+FIT - DTE Inactivity Timeout ... 4-16
+FPR - Fixed DTE Rate ... 4-17
+FMI? - Request Manufacturer Identification ... 4-18
+FMM? - Request Model Identification ... 4-18
+FMR? - Request Revision Identification ... 4-18
+FLO - Flow Control ... 4-19
4.3 Examples ... 4-19
5 Voice Commands ... 5-1
5.1 Voice Commands Overview ... 5-1
5.1.1 <DLE> Shielded Event Codes Sent to the DTE ... 5-2
5.1.2 <DLE> Shielded Codes Sent to the Modem (DCE) ... 5-3
5.2 Voice Commands ... 5-4
5.2.1 Configuration Commands ... 5-4
+FCLASS=8 - Select Voice Mode ... 5-4
+VNH - Automatic Hang-up Control ... 5-4
5.2.2 Voice Commands ... 5-5
+VIP - Voice Initialize All Parameters ... 5-5
+VRX - Start Modem Receive (Record) ... 5-5
+VTR - Start Voice Transmission and Reception (Voice Duplex) ... 5-6
+VTS - Send Voice Tone(s) ... 5-7
+VTX - Start Modem Transmit (Playback) ... 5-9
+VGR - Voice Gain Receive (Record Gain) ... 5-9
+VGT - Voice Gain Transmit (Playback Volume) ... 5-10
+VIT - Voice Inactivity Timer (DTE/Modem) ... 5-11
+VLS - Analog Source/Destination Selection ... 5-11
+VRA - Ringback Goes Away Timer ... 5-15
+VRN - Ringback Never Appeared Timer ... 5-16
+VSD - Silence Detection (Quiet and Silence) ... 5-17
+VSM - Compression Method Selection ... 5-18
+VTD - Beep Tone Duration Timer ... 5-19
+VDR - Distinctive Ring ... 5-20
+VDT - Control Tone Cadence Reporting ... 5-21
+VPR - Select DTE/Modem Interface Rate (Turn Off Autobaud) ... 5-22
5.2.3 Speakerphone Commands ... 5-23

+VSP - Speakerphone ON/OFF 5-23
+VDX - Speakerphone Duplex Mode 5-24
+VGM - Microphone Gain 5-25
+VGS - Speaker Gain 5-26

Tables

Table 3-1. Upload Messages 3-15
Table 3-2. Result Codes 3-21
Table 3-3. Supported V.80 Commands 3-35
Table 3-4. +MS Command Supported Rates 3-57
Table 3-5. AT#UD Last Call Status Report Format 3-87
Table 3-6. Call Setup Result Codes 3-88
Table 3-7. Multimedia Modes 3-88
Table 3-8. DTE-DCE modes 3-88
Table 3-9. V.34 INFO bit report 3-88
Table 3-10. gstnModulationSchemeActive from 3.7.2/V.58 3-89
Table 3-11. errorControl Active from 3.5.2/V.58 3-89
Table 3-12. compressionActive from 3.2.2/V.58 3-89
Table 3-13. callCleared codes from 3.6.4/V.58-1994 3-90
Table 3-14. Completed Data Call, with some errors and rate retrain during the call 3-91
Table 3-15. S-Parameter Summary 3-105
Table 3-16. Result Code Definitions 3-123
Table 4-1. Fax Class 1 and Fax Class 1.0 Commands 4-2
Table 4-2. Fax Class 1 and Fax Class 1.0 Modulation Modes and Rates 4-9
Table 4-3. Inactivity Timer Start and Stop Events 4-16
Table 4-4. Fax Class 1 Calling Sequence (Transmitting a Single Page) 4-20
Table 4-5. Fax Class 1 Answering Sequence (Receiving a Single Page) 4-21
Table 5-1. Voice Commands 5-1
Table 5-2. Supported <DLE> Shielded Codes Sent to the DTE 5-2
Table 5-3. Supported <DLE> Shielded Codes Sent to the Modem (DCE) 5-3
Table 5-4. +VNH Command Behavior 5-4
Table 5-5. +VLS Command Options 5-13
Table 5-6. Events Detectable in the Voice Mode per V.253 5-14

Revision History

Incorporated in Doc. No. 102184B

1. Section 3.2.1, Revised ** command description.
2. Section 3.2.4: Deleted %U command description.
3. Section 3.2.11, Revised %F command description.
4. Table 3-15: Added S17 row.

Incorporated in Doc. No. 102184A

Initial release.

This page is intentionally blank.

1 Introduction

1.1 Overview

This manual describes the host command and responses for the following Conexant modem families:

CX81801 SmartV.XX Modem

CX06833 SMXXD Modem

CX81300 SmartACF Modem

CX06827 SCXXD Modem

The commands and responses are implemented in controller firmware for specific modem models. Additional configuration and implementation information is available in release notes and/or readme files that accompany product firmware release.

The descriptions in this manual apply to all commands and parameters that may be supported by different modem models.

1.1.1 Command Syntax

The fundamental DTE interface command syntax is described in Section 2.

1.1.2 Command Descriptions

Commands are grouped into the following categories:

Syntax and procedures	Section 2
Data commands	Section 3
Fax Class 1 and Fax Class 1.0 commands	Section 4
Voice/Audio commands	Section 5

1.1.3 Call Progress and Blacklisting Parameters

The SmartACF, SmartACFL, and SCXXD modem MCU firmware may be provided either in reconfigurable form or preconfigured form. Consult the specific firmware release notes for exact configuration information.

Reconfigurable Form. The modem MCU firmware can be configured for operation in specific countries by the PC-compatible ConfigurACE II program. The call progress and blacklisting parameters described in the ConfigurACE II User's Manual can be altered and loaded for a number of countries by this program.

Preconfigured Form. Specific MCU firmware configurations may be released that can be directly installed without requiring the use of ConfigurACE II.

1.1.4 ConfigurACE II for Windows Utility Program

The PC-based ConfigurACE II for Windows utility program allows the OEM to customize SmartACF and SmartACFL modem firmware to suit specific application and country requirements. ConfigurACE II for Windows allows programming of functions such as:

- Loading of multiple sets of country parameters
- Loading of NVRAM factory profiles
- Call progress and blacklisting parameters
- Entry of S parameter maximum/minimum/default values
- Limitation of transmit levels
- Modification of factory default values
- Customization of the ATI4 response
- Customization of fax OEM messages
- Enabling of Telephony Extension features
- Direct Mode

This program modifies the hex object code which can be programmed directly into the system Flash ROM. Lists of the generated parameters can be displayed or printed.

Conexant-provided country parameter files allow a complete set of country-specific call progress and blacklisting parameters to be selected.

Refer to the ConfigurACE II for Windows software for a detailed description of capabilities and the operating procedure.

1.2 Reference Documentation

Document Title	Document No.
CX81300 SmartACF Modem Data Sheet	100488
CX06827 SCXXD Modem Device Set Data Sheet	101098
CX06833 SMXXD Modem Device Set Data Sheet	101840
CX81801-3x SmartV.XX Modem with 128-Pin TQFP Data Sheet	101898
CX81801-7x/8x SmartV.XX Modem with 128-Pin TQFP Data Sheet	102199
CX81801-4x SmartV.XX Modem with 28-Pin CTLGA Data Sheet	102025
CX81801-9x SmartV.XX-V.92 Modem with 28-Pin CTLGA Data Sheet	102179

2 Syntax and Procedures

The command and response syntax and procedures generally conform to referenced recommendations and standards. Since these recommendations and standards describe characteristics universal to a large installed base of modems to a maximum degree, there may be syntax and procedural differences due to extensions and behavioral differences in implemented commands, parameters, and responses beyond that described in these recommendations and standards.

The syntax and procedures described in this section are based on V.250 and V.253 with additional information included for implemented extensions, behavioral differences beyond V.250, and legacy commands.

2.1 Alphabet

The T.50 International Alphabet 5 (IA5) is used in this document. Only the low-order seven bits of each character are significant to the modem; any eighth or higher-order bit(s), if present, are ignored for the purpose of identifying commands and parameters. Lower-case characters are considered identical to their upper-case equivalents when received by the modem from the DTE. Result codes from the modem are in upper case.

2.2 DTE Commands Lines

Words enclosed in <angle brackets> are references to syntactical elements. The brackets are not used when the words appear in a command line, the brackets are not used. Words enclosed in [square brackets] represent optional items which may be omitted from the command line at the specified point. The square brackets are not used when the words appear in the command line. Other characters that appear in syntax descriptions must as included as shown.

Any modem responses are mentioned in terms of their alphabetic format; the actual response issued will depend on the setting of parameters that affect response formats, e.g., Q and V commands (see 2.7).

2.2.1 Command Line General Format

A command line is made up of three elements: the prefix, the body, and the termination character.

The command line prefix consists of the characters "AT" or "at" or, to repeat the execution of the previous command line, the characters "A/" or "a/".

The body is made up of individual commands described in this document. Space characters (IA5 2/0) are ignored and may be used freely for formatting purposes, unless they are embedded in numeric or string constants. The termination character may not appear in the body. The modem can accept at least 50 characters in the body.

The termination character may be selected by a user option (parameter S3), the default being CR.

2.2.2 Command Line Editing

The character defined by parameter S5 (default, BS) is interpreted as a request from the DTE to the modem to delete the previous character. Any control characters (IA5 0/0 through 1/15, inclusive) that remain in the command line after receipt of the termination character are ignored by the modem.

The modem checks characters from the DTE first to see if they match the termination character (S3), then the editing character (S5), before checking for other characters. This ensures that these characters will be properly recognized even if they are set to values that the modem uses for other purposes. If S3 and S5 are set to the same value, a matching character will be treated as matching S3 (S3 is checked before S5).

2.2.3 Command Line Echo

The modem may echo characters received from the DTE during command state and online command state back to the DTE, depending on the setting of the E command. If enabled, characters received from the DTE are echoed in the same format as received. Invalid characters in the command line or incomplete or improperly-formed command line prefixes may not be echoed.

2.2.4 Repeating a Command Line

If the prefix "A/" or "a/" is received, the modem immediately executes once again the body of the preceding command line. No editing is possible, and no termination character is necessary. A command line may be repeated multiple times in this manner. Responses to the repeated command line are issued using format of the original command line. If "A/" is received before any command line has been executed, the preceding command line is assumed to have been empty (that results in an OK result code).

2.2.5 Types of DTE Commands

There are two types of commands: action commands and parameter commands. Commands of either type may be included in command lines, in any order.

Action commands may be "executed" (to invoke a particular function of the equipment, which generally involves more than the simple storage of a value for later use), or "tested" (to determine whether or not the equipment implements the action command, and, if subparameters are associated with the action, the ranges of subparameter values that are supported).

Parameters may be "set" (to store a value or values for later use), "read" (to determine the current value or values stored), or "tested" (to determine whether or not the equipment implements the parameter, and the ranges of values supported).

2.3 Basic Syntax Commands

2.3.1 Basic Syntax Command Format

The format of Basic Syntax commands, except for the D and S commands, is as follows:

<command>[<number>]

where <command> is either a single character, or the "&" character followed by a single character per V.250. In addition, <command> can be the "%" character followed by a single character, the "*" character followed by a single character, or the "^" character followed by a single character.

<number> may be a string of one or more characters from "0" through "9" representing a decimal integer value. Commands that expect a <number> are noted in the description of the command. If a command expects <number> and it is missing (<command> is immediately followed in the command line by another <command> or the termination character), the value "0" is assumed. If a command does not expect a <number> and a number is present, an ERROR is generated. All leading "0"s in <number> are ignored by the modem.

Additional commands may follow a command (and associated parameter, if any) on the same command line without any character required for separation. The actions of some commands cause the remainder of the command line to be ignored (e.g., A).

See the D command for details on the format of the information that follows it.

2.3.2 S-Parameters

Commands that begin with the letter "S" are known as "S-parameters". The number following the "S" indicates the "parameter number" being referenced. If the number is not recognized as a valid parameter number, an ERROR result code is issued.

Immediately following this number, either a "?" or "=" character must appear. "?" is used to read the current value of the indicated S-parameter; "=" is used to set the S-parameter to a new value.

S<parameter_number>?

S<parameter_number>=[<value>]

If the "=" is used, the new value to be stored in the S-parameter is specified in decimal following the "=". If no value is given (i.e., the end of the command line occurs or the next command follows immediately), the S-parameter specified may be set to 0, or an ERROR result code issued and the stored value left unchanged. The ranges of acceptable values are given in the description of each S-parameter.

If the "?" is used, the modem transmits a single line of information text to the DTE. The text portion of this information text consists of exactly three characters, giving the value of the S-parameter in decimal, with leading zeroes included.

2.4 Extended Syntax Commands

2.4.1 Command Naming Rules

Both actions and parameters have names, which are used in the related commands. Names always begin with the character "+". Following the "+", from one to 16 additional characters appear in the command name. These characters will be selected from the following set:

A through Z	(IA5 4/1 through 5/10)
0 through 9	(IA5 3/0 through 3/9)
!	(IA5 2/1)
%	(IA5 2/5)
-	(IA5 2/13)
.	(IA5 2/14)
/	(IA5 2/15)
:	(IA5 3/10)
_	(IA5 5/15)

The first character following the "+" is an alphabetic character in the range of "A" through "Z". This first character generally implies the application in which a command is used (e.g., F for Fax or V for voice).

The modem considers lower-case characters to be the same as their upper-case equivalents.

2.4.2 Values

When subparameters are associated with the execution of an action, or when setting a parameter, the command may include specification of values. This is indicated by the appearance of <value> in the descriptions below.

<value> consists of either a numeric constant or a string constant.

Numeric Constants

Numeric constants are expressed in decimal, hexadecimal, or binary.

Decimal numeric constants consist of a sequence of one or more of the characters "0" through "9", inclusive.

Hexadecimal numeric constants consist of a sequence of one or more of the characters "0" through "9", inclusive, and "A" through "F" inclusive. The characters "A" through "F" represent the equivalent decimal values 10 through 15.

Binary numeric constants consist of a sequence of one or more of the characters "0" and "1".

In all numeric constants, the most significant digit is specified first. Leading "0" characters are ignored by the modem. No spaces, hyphens, periods, commas, parentheses, or other generally-accepted numeric formatting characters are permitted in numeric constants; note in particular that no "H" suffix is appended to the end of hexadecimal constants.

String Constants

String constants consist of a sequence of displayable IA5 characters, each in the range from 2/0 to 7/15, inclusive, except for the characters '"' (IA5 2/2) and "\" (IA5 5/12). String constants are bounded at the beginning and end by the double-quote character ('"', IA5 2/2).

Any character value may be included in the string by representing it as a backslash ("\") character followed by two hexadecimal digits. For example, "\0D" is a string consisting of the single character <CR> (IA5 0/13). If the "\" character itself is to be represented in a string, it is encoded as "\5C". The double-quote character, used as the beginning and ending string delimiter, is represented within a string constant as "\22".

A "null" string constant, or a string constant of zero length, is represented by two adjacent delimiters ("").

Compound Values

Actions may have more than one subparameter associated with them, and parameters may have more than one value. These are known as "compound values", and their treatment is the same in both actions and parameters.

A compound value consists of any combination of numeric and string values (as defined in the description of the action or parameter). The comma character must be included as a separator, before the second and all subsequent values in the compound value. If a value is not specified (i.e., defaults assumed), the required comma separator must be specified; however, trailing comma characters may be omitted if all associated values are also omitted.

2.4.3 Action Commands

Action Execution Command Syntax

There are two general types of action commands: those that have associated subparameter values that affect only that invocation of the command, and those that have no subparameters.

If subparameters are associated with a command, the definition of the action command indicates, for each subparameter, whether the specification of a value for that subparameter is mandatory or optional. For optional subparameters, the definition indicates the assumed (default) value for the subparameter if no value is specified for that subparameter; the assumed value may be either a previous value (i.e., the value of an omitted subparameter remains the same as the previous invocation of the same command, or is determined by a separate parameter or other mechanism), or a fixed value (e.g., the value of an omitted subparameter is assumed to be zero). Generally, the default value for numeric subparameters is 0, and the default value for string subparameters is **""** (empty string).

The following syntax is used for actions that have no subparameters:

+<name>

The following syntax is used for actions that have one subparameter:

+<name>[=<value>]

The following syntax is used for actions that have two or more subparameters:

+<name>[=<compound_value>]

For actions that accept subparameters, if all subparameters are defined as being optional, and the default values for all subparameters are satisfactory, the data terminal equipment (DTE) may use the first syntax above (i.e., omit the "=" from the action execution command as well as all of the subparameter value string).

If all other relevant criteria are met (e.g., the modem is in the proper state), the command is executed with any indicated subparameters. If <name> is not recognized, the modem issues the ERROR result code and terminates processing of the command line. An ERROR is also generated if a subparameter is specified for an action that does not accept subparameters, if too many subparameters are specified, if a mandatory subparameter is not specified, if a value is specified of the wrong type, or if a value is specified that is not within the supported range.

Action Test Command Syntax

The DTE may test if an action command is implemented in the modem by using the syntax:

+<name>=?

If the modem does not recognize the indicated name, it returns an ERROR result code and terminates processing of the command line. If the modem does recognize the action name, it returns an OK result code. If the named action accepts one or more subparameters, the modem sends an information text response to the DTE, prior to the OK result code, specifying the values supported by the modem for each such subparameter, and possibly additional information. The format of this information text is defined for each action command.

2.4.4 Parameter Commands

Parameter Types

Parameters may be defined as "read-only" or "read-write". "Read-only" parameters are used to provide status or identifying information to the DTE, but cannot be set by the DTE; attempting to set their value is an error. In some cases (specified in the description of the individual parameter), the modem may ignore attempts to set the value of such parameters rather than respond with an ERROR result code, if the continued correct operation of the interface between the modem and DTE will not be affected by such action. Read-only parameters may be read and tested.

"Read-write" parameters may be set by the DTE, to store a value or values for later use. Read-write parameters may be set, read, and tested.

Parameters may take either a single value, or multiple (compound) values. Each value may be either numeric or string; the definition of the parameter will specify the type of value for each subparameter. Attempting to store a string value in a numeric parameter, or a numeric value in a string parameter, is an error.

Parameter Set Command Syntax

The definition of the parameter indicates, for each value, whether the specification of that value is mandatory or optional. For optional values, the definition indicates the assumed (default) value if none is specified; the assumed value may be either a previous value (i.e., the value of an omitted subparameter retains its previous value), or a fixed value (e.g., the value of an omitted subparameter is assumed to be zero). Generally, the default value for numeric parameters is 0, and the default value for string parameters is "" (empty string).

The following syntax is used for parameters that accept a single value:

+<name>=[<value>]

The following syntax is used for parameters that accept more than one value:

+<name>=[<compound_value>]

For each implemented parameter, if all mandatory values are specified, and all values are valid according to the definition of the parameter, the specified values are stored. If <name> is not recognized, one or more mandatory values are omitted, or one or more values are of the wrong type or outside the permitted range, the modem issues the ERROR result code and terminates processing of the command line. An ERROR is also generated if too many values are specified. In case of an error, all previous values of the parameter are unaffected.

Parameter Read Command Syntax

The DTE may determine the current value or values stored in a parameter by using the following syntax:

+<name>?

The modem responds by sending the current values stored for the parameter to the DTE in an information text response. The format of this response is described in the definition of the parameter. Generally, the values are sent in the same form in which they would be issued by the DTE in a parameter setting command; if multiple values are supported, they will generally be separated by commas, as in a parameter setting command.

Parameter Test Command Syntax

The DTE may test if a parameter is implemented in the modem, and determine the supported values, by using the syntax:

+<name>=?

If the modem does not recognize the indicated name, it returns an ERROR result code and terminates processing of the command line. If the modem does recognize the parameter name, it returns an information text response to the DTE, followed by an OK result code. The information text response indicates the values supported by the modem for each such subparameter, and possibly additional information. The format of this information text is defined for each parameter.

2.4.5 Additional Syntax Rules

Concatenating Commands after Extended Syntax Commands

Additional commands may follow an extended-syntax command on the same command line if a semicolon (";") is inserted after the preceding extended command as a separator.

The semicolon is not necessary when the extended syntax command is the last command on the command line.

Concatenating Commands after Basic Format Commands

Extended syntax commands may appear on the same command line after a basic syntax command without a separator, in the same manner as concatenation of basic syntax commands.

2.5 Issuing Commands

All characters in a command line must be issued at the same data rate, and with the same parity and format.

The modem will ignore any command line that is not properly terminated. The modem may consider 30 seconds of mark idle time between any two characters as an improperly terminated command line. In this case the modem may or may not generate an ERROR message. The modem will ignore any characters received from the DTE that are not part of a properly-formatted command line.

If the maximum number of characters that the modem can accept in the body is exceeded, an ERROR result code is generated after the command line is terminated.

The DTE will not begin issuing a subsequent command line until at least one-tenth of a second has elapsed after receipt of the entire result code issued by the modem in response to the preceding command line.

2.6 Executing Commands

Upon receipt of the termination character, the modem commences execution of the commands in the command line in the order received from the DTE. Should execution of a command result in an error, or a character be not recognized as a valid command, execution is terminated, the remainder of the command line is ignored, and the ERROR result code is issued. Otherwise, if all commands execute correctly, only the result code associated with the last command is issued; result codes for preceding commands are suppressed. If no commands appear in the command line, the OK result code is issued.

2.6.1 Aborting Commands

Some action commands that require time to execute may be aborted while in progress; these are explicitly noted in the description of the command. Aborting of commands is accomplished by the transmission from the DTE to the modem of any character. A single character is sufficient to abort the command in progress; however, characters transmitted during the first 125 milliseconds after transmission of the termination character are ignored (to allow for the DTE to append additional control characters such as line feed after the command line termination character). **To ensure that the aborting character is recognized by the modem, it should be sent at the same rate as the preceding command line; the modem may ignore characters sent at other rates.** When such an aborting event is recognized by the modem, the modem terminates the command in progress and returns an appropriate result code to the DTE, as specified for the particular command.

2.6.2 Handling of Invalid Numbers and S-Parameter Values

The modem reacts to undefined numbers and S-parameter values in one of three ways:

1. Issue the ERROR result code, and leave the previous value of the parameter unchanged;
2. Issue the OK result code, and leave the previous value of the parameter unchanged; or,
3. Issue the OK result code, and set the parameter value to the valid value nearest to that specified in the command line.

The description of each command specifies which of these three techniques is used to handle invalid parameter values for that command or parameter.

2.7 Modem Responses

While in command state and online command state, the modem will issue responses using the same rate, word length, and parity as the most recently received DTE command line. In the event that no DTE command has yet been received, rate, word length, and parity used will depend on the capabilities of the modem.

When the modem transitions from the command state or online command state to the online data state, the result code **CONNECT** should be issued at the bit rate and parity used during the command state. When the modem transitions from the online data state to the command state or online command state, the result codes should be issued at the bit rate used during the online data state. Thereafter, any unsolicited result codes should use the bit rate and parity of the last command line issued by the DTE to the modem.

The characters of a response will be contiguous, with no more than 100 milliseconds of mark idle issued between characters in addition to stop elements.

2.7.1 Responses

There are two types of responses that may be issued by the modem: information text and result codes.

Information Text. Information text responses consist of three parts: a header, information text, and a trailer:

1. The characters transmitted for the header are determined by the V command.
2. The trailer consists of two characters, being the character having the ordinal value of parameter S3 followed by the character having the ordinal value of parameter S4.
3. Information text usually consists of a single line; information text returned in response to some commands may contain multiple lines, and the text may therefore include CR, LF, and other formatting characters to improve readability.

Result Code Parts. Result codes consist of three parts: a header, the result text, and a trailer.

1. The characters transmitted for the header and trailer are determined by the V command setting.
2. The result text may be transmitted as a number or as a string, also depending on a the V command setting.

Result Code Types. There are three types of result codes: final, intermediate, and unsolicited. Result codes are described in Section 3.4.

1. A final result code indicates the completion of a full modem action and a ability to accept new commands from the DTE.
2. An intermediate result code is a report of the progress of an modem action. The CONNECT result code is an intermediate result code. In the case of a dialing or answering command, the modem switches from command state to online data state, and issues a CONNECT result code. This is an intermediate result code for the modem because it cannot accept commands from the DTE while in online data state. When the modem switches back to the command state it then issues a final result code (such as OK or NO CARRIER).
3. Unsolicited result codes (such as RING) indicate the occurrence of an event not directly associated with the issuance of a command from the DTE.

2.7.2 Extended Syntax Result Codes

Extended syntax result codes may be issued in response to either basic or extended commands, or both. The appropriate responses are specified in the definitions of the commands, the responses, or both.

The general format of extended syntax result codes is the same as result codes defined in TIA-602 with regard to headers and trailers. The characters specified in S-parameters S3 and S4 are used in headers and trailers of extended syntax result codes as they are in basic format result codes. The setting of the V command affects the headers and trailers associated with extended syntax result codes in the same manner as basic format result codes; however, unlike basic format result codes, extended syntax result codes have no numeric equivalent, and are always issued in alphabetic form.

Extended syntax result codes are subject to suppression by the Q1 command, as with basic format result codes. The issuance of extended syntax result codes are not be affected by the setting of the X command.

Extended syntax result codes may be either final, intermediate, or unsolicited; the type being indicated in the definition of the result code.

Extended syntax result codes are prefixed by the "+" character to avoid duplication of basic format result codes specified in TIA-602. Following the "+" character, the name of the result code appears; result code names follow the same rules as command names.

Extended syntax result codes may include the reporting of values. The definition of the result code specifies whether or not values are appended to the result code, and, if so, how many, their types, and their assumed default values if omitted.

Data/voice Modes. When no values are to be reported, the result code appears in the simplest form:

+<name>

If a single value is to be reported, the form of the result code is:

+<name>: <value>

A single space character separates the colon character from the <value>; no space appears between the result code name and the colon. If multiple values are to be reported with the result code, the form is:

+<name>: <compound_value>

Fax Modes. If a single value is to be reported, the form of the result code is:

<value> or (<value>)

2.7.3 +<name>: <compound_value>Information Text Formats for Test Commands

In general, the format of information text returned by extended syntax commands is described in the definition of the command.

The modem may insert intermediate <CR> characters in very long information text responses in order to avoid overrunning DTE receive buffers. If intermediate <CR> characters are included, the modem does not include the character sequences "0 <CR>"or "OK<CR>", so that DTE can avoid false detection of the end of these information text responses.

Range of Values

When the action accepts a single numeric subparameter, or the parameter accepts only one numeric value, the set of supported values may be presented in the information text as an ordered list of values. The list is preceded by a left parenthesis (() , and is followed by a right parenthesis ()). If only a single value is supported, it appears between the parentheses. If more than one value is supported, then the values may be listed individually, separated by comma characters, or, when a continuous range of values is supported, by the first value in the range, followed by a hyphen character (-), followed by the last value in the range. The specification of single values and ranges of values may be intermixed within a single information text. In all cases, the supported values are indicated in ascending order.

For example, the following are some examples of value range indications:

(0)	Only the value 0 is supported.
(1,2,3)	The values 1, 2, and 3 are supported.
(1-3)	The values 1 through 3 are supported.
(0,4,5,6,9,11,12)	The several listed values are supported.
(0,4-6,9,11-12)	An alternative expression of the above list.

Compound Range of Values

When the action accepts more than one subparameter, or the parameter accepts more than one value, the set of supported values is presented as a list of the parenthetically-enclosed value range strings described above, separated by commas. For example, the information text in response to testing an action that accepts three subparameters, and supports various ranges for each of them, could appear as follows:

(0),(1-3),(0,4-6,9,11-12)

This indicates that the first subparameter accepts only the value 0, the second accepts any value from 1 through 3 inclusive, and the third subparameter accepts any of the values 0, 4, 5, 6, 9, 11, or 12.

This page is intentionally blank.

3 Data Command Set

3.1 Command Guidelines

The commands used to control and report modem operation in data modem mode are defined in this section.

The Data Modem Mode commands and responses described in this section are applicable when command +FCLASS=0. (See Section 3.2.1 for the definition of the FCLASS command.)

The default values are typical of a fully configured modem supporting all data rates and options. The actual default value is dependent upon installed modem firmware and country specific parameters.

Commands are accepted by the modem once the previous command has been fully executed, which is normally indicated by the return of an appropriate result code. Execution of commands D and A, either as a result of a direct command or a re-execute command, will be aborted if another character is entered before completion of the handshake.

3.1.1 Escape Code Sequence

When the modem has established a connection and has entered on-line data mode, it is possible to break into the data transmission in order to issue further commands to the modem in an on-line command mode. This is achieved by the DTE sending to the modem a sequence of three ASCII characters specified by register S2. The default character is '+'. The maximum time allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE is controlled by the S12 register.

3.2 Data Commands

The modem will respond to the commands detailed below. Parameters applicable to each command are listed with the command description. The defaults shown for each configuration command are those used in the Conexant factory profile 0.

3.2.1 Generic Modem Control

Z - Soft Reset and Restore Profile

This command causes the modem to perform a soft reset and restore (recall) the configuration profile. If no <value> is specified, zero is assumed.

Syntax

Z<value>

Defined Values

<value>	Decimal number corresponding to the selected profile.	
	0	Soft reset and restore stored profile 0.
	1	Soft reset and restore stored profile 1.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

+FCLASS - Select Active Service Class

This command selects the active service class (mode).

Syntax

+FCLASS=<mode>

Defined Values

<mode>	Decimal number which corresponds to the selected service class.	
	0	Select Data Mode (Section 3). (Default.)
	1	Select Facsimile Class 1 Mode. (Section 4).
	1.0	Select Facsimile Class 1.0 Mode. (Section 4).
	8	Select Voice Mode. (Section 5).
	10	Reserved.

Result Codes

OK	For <mode> = 0, 1, 1.0, 8, and 10
ERROR	Otherwise.

Reporting Current or Selected Values

Command: +FCLASS?

Response: +FCLASS: <mode>

Example: +FCLASS: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +FCLASS=?

Response: +FCLASS: (<mode> range)

Example: +FCLASS: (0,1,1.0,8,10)

+VCID - Caller ID (CID)

This command controls the reporting and presentation of data associated with the Caller ID services in the Incoming Call Line ID (ICLID) data format for the next call.

Syntax

+VCID=<pmode>

Defined Values

<pmode> Decimal number corresponding to the selected option.

0	Disable Caller ID reporting. (Default.)
1	Enables Caller ID with formatted presentation to the DTE. The modem presents the data items in a <Tag><Value> pair format. The expected pairs are date, time, name, and caller code (telephone number),
2	Enables Caller ID with unformatted presentation to the DTE.

Reporting Current or Selected Values

Command: +VCID?

Response: +VCID: <pmode>

Example: +VCID: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VCID=?

Response: +VCID: (<pmode> range)

Example: +VCID: (0-2)

+VRID - Report Retrieved Caller ID (CID)

This command reports the data associated with the Caller ID services in the Incoming Call Line ID (ICLID) data format for the last received call.

Syntax

+VRID=<pmode>

Defined Values

<pmode> Decimal number corresponding to the selected option.

- 0 Reports Caller ID with formatted presentation to the DTE. The modem presents the data items in a <Tag><Value> pair format. The expected pairs are date, time, name, and caller code (telephone number),
- 1 Reports Caller ID with unformatted presentation to the DTE.

Reporting Supported Range of Parameter Values

Command: +VRID=?

Response: +VRID: (<pmode> range)

Example: +VRID: (0,1)

\N - Operating Mode

This command controls the preferred error correcting mode to be negotiated in a subsequent data connection. This command is affected by the OEM firmware configuration.

Syntax

\N<mode>

Defined Values

<mode> Decimal number which corresponds to the selected mode.

0	Selects normal speed buffered mode (disables error-correction mode). (Forces &Q6.)
1	Serial interface selected - Selects direct mode and is equivalent to &M0, &Q0 mode of operation. (Forces &Q0.)
	Parallel interface selected - Same as \N0.
2	Selects reliable (error-correction) mode. The modem will first attempt a LAPM connection and then an MNP connection. Failure to make a reliable connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=7.)
3	Selects auto reliable mode. This operates the same as \N2 except failure to make a reliable connection results in the modem falling back to the speed buffered normal mode. (Forces &Q5, S36=7, and S48=7.)
4	Selects LAPM error-correction mode. Failure to make an LAPM error-correction connection results in the modem hanging up. (Forces &Q5 and S48=0.) Note: The -K1 command can override the \N4 command.
5	Selects MNP error-correction mode. Failure to make an MNP error-correction connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=128.)

Result Codes

OK	<mode> = 0 to 5.
ERROR	Otherwise.

I - Identification

This command causes the modem to reports the requested result according to the command parameter.

Syntax

I<value>

Defined Values

<value> Decimal number corresponding to the selected information.

0 Reports product code, e.g., “56000”.

1 Reports the least significant byte of the stored checksum in decimal. Reports 255 if the prestored checksum value is FFh.

2 Reports "OK".

3 Reports identification codes.

For the SmartACF and SCXXD, the codes are in the form RevisionName-Modulation_Model, where:

RevisionName = product family name_firmware version, i.e., ACF3. The firmware version is in the form VX.XXX. Example: ACF3_V1.000

Modulation = V90, V34, or V32 for V.92/V.90, V.34, or V.32bis, respectively.

Model = Identifies RAM/ROM configuration.

For the SmartV.XX and SMXXD, the codes are in the form RevisionName-Modulation, where:

RevisionName = masked firmware code version. Example: CX81801

Modulation = V90, V34, or V32 for V.90, V.34, or V.32bis, respectively.

Examples:

ACF3_V1.000-V90_P21_FSH

CX81801-V90

Note: If RPI+ is enabled (see +Hn), “ROCKWELL RPI (TM) MODEM+01” is appended.

4	Reports OEM defined identifier string in either Hayes-compatible binary format (default) or ASCII format (selectable by ConfigurACE), e.g.: a007040284C6002F bC60000000 r1005111151012000 r3000111170000000
5	Reports Country Code parameter (see +GCI).
6	Reports modem data pump model and internal code revision. Example: "RCV56DPF-PLL L8773A Rev 62.01/62.01".
7	Reports "OK".

Result Codes

OK	<value> = 0 - 7.
ERROR	Otherwise.

+GMI - Request Manufacturer Identification

This command causes the modem to report the modem product manufacturer.

Syntax

+GMI

Typical Response

+GMI: CONEXANT
OK

+GMI9 - Request Conexant Identification

This command causes the modem to report CONEXANT ACF identification. The response cannot be modified using ConfigurACE.

Syntax

+GMI9

Response

+GMI9: CONEXANT ACF
OK

+GMM - Request Model Identification

This command causes the modem to report the modem product.

Syntax

+GMM

Typical Response

+GMM: V90

+GMR - Request Revision Identification

This command causes the modem to report the modem version, revision level or date. This is the same as the I3 command.

Syntax

+GMR

Typical Response

+GMR: P2109-V90
OK

+GCAP - Request Complete Capabilities List

This extended-format command causes the modem to transmit one or more lines of information text listing additional capabilities command +<name>s , which is intended to permit the user to identify the overall capabilities of the modem. In particular, if the modem implements a particular modem control standard that uses Extended Syntax Commands, and if that modem control standard includes command(s) that indicate general capabilities, the +<names>(s) of those commands will be reported to the modem in response to a +GCAP command.

Syntax

+GCAP

Example Responses

+GCAP: +FCLASS, +MS, +ES, +DS,

for a data modem that supports all capabilities listed

Where:

+FCLASS	T.class1, +F (Class 1 Facsimile modem Control)
+MS	+M commands (Modulation Control: +MS and +MR commands)
+ES	+E commands (Error Control: +ES, +EB, +ER, +EFCS, +ETBM)
+DS	+D commands (Data Compression: +DS and +DR)

+GCI - Country of Installation

This extended syntax command selects and indicates the country of installation for the modem. This parameter selects the settings for any operational parameters that need to be adjusted for national regulations or telephone networks.

Syntax

+GCI=<country_code>

Defined Values

<country_code>	8-bit country code from Annex A of T.35. The value is the hexadecimal equivalent of the T.35 code, with bit 8 treated as the most significant bit and bit 1 treated as the least significant bit. The supported countries are listed in the data sheet or in the release notes for the applicable modem.

Default

If the modem is specified for use in only one country, that country code is the default. Otherwise, the default is defined by the OEM. Factory default is B5 (United States).

Reporting Current or Selected Values

Command:	+GCI?	
Response:	+GCI: <current country_code>	
Example:	+GCI: 3D	The modem is set for France.

Reporting Supported Range of Parameter Values

Command:	+GCI=?	
Response:	+GCI: (<country_code>[,<country_code>[,<country_code].....]]	
Example:	+GCI: (00,B4,B5)	The modem can be set for Japan, United Kingdom, or the United States.

&F - Restore Factory Configuration (Profile)

The modem loads the factory default configuration (profile). The factory defaults are identified for each command and in the S-Parameter descriptions. A configuration (profile) consists of a subset of S-Parameters.

Syntax

&F[<value>]

Defined Values

<value>	Decimal number corresponding to the selected configuration.	
	0	Restore factory configuration 0.
	1	Restore factory configuration 1.

Result Codes

OK	
ERROR	If the modem is connected.

&T - Local Analog Loopback Test

The modem will perform the local analog loopback test if &T1 is selected. The test can be run only when in an asynchronous operation in non-error-correction mode (normal), e.g., AT&Q6. To terminate the test in progress, the escape sequence must be entered first (see Section 3.1.1).

Syntax

&T[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Terminates test in progress. Clears S16.
	1	Initiates local analog loopback, V.54 Loop 3. Sets S16 bit 0. If a connection exists when this command is issued, the modem hangs up. The CONNECT XXXX message is displayed upon the start of the test.

&Y - Designate a Default Reset Profile

This command selects which user profile will be used after a hard reset.

Syntax

&Y<value>

Defined Values

<value>	Decimal number corresponding to the selected profile.	
	0	The modem will use profile 0.
	1	The modem will use profile 1.

Result Codes

OK	<value> = 0 to 1.
ERROR	If <value> > 1, or if NVRAM is not installed or is not operational.

&W - Store Current Configuration

Saves the current (active) configuration (profile), including S-Parameters, in one of the two user profiles in NVRAM as denoted by the parameter value. This command will yield an ERROR message if the NVRAM is not installed or is not operational as detected by the NVRAM test.

The current configuration is comprised of a list of storable parameters illustrated in the &V command. These settings are restored to the active configuration upon receiving a Zn command or at power up (see &Yn command).

Syntax

&W<value>

Defined Values

<value>	Decimal number corresponding to the selected profile.	
	0	Store the current configuration as profile 0.
	1	Store the current configuration as profile 1.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

&Zn=x - Store Telephone Number

The modem can store up to four telephone numbers and each telephone number dial string can contain up to 31 digits. (Requires 256-byte NVRAM installed.)

Syntax

&Z<value>

Defined Values

<value>	Decimal number from 0 to 3 corresponding to the selected telephone number.
<string>	Dial string from 0 to 31 characters.

Result Codes

OK	For <value> ≤ 3, and <string> ≤ 31 digits.
ERROR	If <value> > 3, <string> > 31 digits, or if NVRAM is not installed or is not operational.

%7 - Plug and Play Serial Number

Sets and stores eight serial numbers in hex format used for serial Plug and Play and for ISA Plug and Play which use the Conexant 11596 Plug and Play device. Applicable to Desktop configuration only.

Syntax

%7<8 hex numbers><same 8 hex numbers>

Example

%7<8 hex numbers><same 8 hex numbers>

Result Codes

OK	<8 hex numbers><same 8 hex numbers>
ERROR	Otherwise

To display the stored serial number, issue AT"?<cr>.

%8 - Plug and Play Vendor ID and Product Number

Sets and stores Vendor ID and product number for serial Plug and Play and for ISA Plug and Play which use the Conexant 11596 Plug and Play device. Applicable to Desktop configuration only.

Syntax

&8<3 ASCII characters><4 hex numbers><same 3 ASCII characters><same 4 hex numbers><cr>

Example

%8<3 ASCII characters><4 hex numbers><same 3 ASCII characters><same 4 hex numbers><cr>

Result Codes

OK	<3 ASCII characters><4 hex numbers><same 3 ASCII characters><same 4 hex numbers>
ERROR	Otherwise

**- Load Flash Memory

The AT** command allows users to customize modem firmware by uploading flash memory firmware, NVRAM patch or internal SRAM patch.

Uploading flash memory firmware

The linear flash memory loader allows flash memory connected to the modem external memory bus to be upgraded with revised modem firmware. This process transfers the upgraded modem firmware from the host computer to the modem, which transfers the data to the flash memory device. Uploading new firmware to the flash memory or is a two-step process.

1. When the AT** command is issued, the modem firmware boot loader is invoked and the user will first load a flash load module (FLM) into the modem's RAM. The data transfer is done via an ASCII transfer. The FLM contains the programming algorithm for the flash memory device being programmed and any messages that may be sent during the load process.
2. The user will then load the new modem firmware which the FLM will then program into the flash memory device. This transfer is done via ASCII transfer.

Procedure

1. Install in the modem a flash memory programmed with the modem firmware or a blank flash memory.
2. Put the FLM (e.g. F45Aload.S37) and the new modem firmware file (e.g. ACF31900V90P21FSH282621p3v9.s37) in an appropriate directory on the computer's hard disk.
3. Configure the communications application program for a DTE rate of between 9600 bps and 115200 bps and RTS/CTS flow control. Note: When programming a blank or corrupt flash device the modem's automatic speed sensing function does not operate and the modem defaults to 57600 bps.
4. Check the modem for response by typing AT.
5. Initiate the download process using the AT** command. The "Download flash code…" message appears upon issuing the AT** command.
6. Perform an ASCII transfer of the FLM file (e.g., F45Aload.37) from the host computer to the modem RAM using an industry standard communications software or an equivalent process (ensure that all ASCII translation or pacing is turned off).
7. After the FLM has been loaded perform an AASCI upload of the new modem firmware hex file (e.g., ACF31900V90P21FSH282621p3v9.s37) from the host computer to the modem RAM using industry standard communications software or an equivalent process.
8. The messages described in Table 3-1 may occur during the uploading process:

Table 3-1. Upload Messages

Message	Description
Device not supported	Displayed if the FLM used does not support the flash memory that is installed on the board.
Wrong S37 format	Displayed if the modem firmware being uploaded is not in Motorola S3 format.
Record error	Displayed if there is an error while either uploading or downloading. If this occurs, the transfer should be aborted, and the user should restart at step 5.
Download abort	Displayed if the transfer is aborted before it is finished. If this occurs, the user should restart at step 5.
Erase fail	Displayed if the FLM is unable to erase the flash memory. If this occurs, the user should restart at step 5.
Download error, Re-Load	Displayed if there was an error when uploading or downloading. If this occurs, the user should restart at step 5.
Error, No H/W flow ctl	Displayed if RTS-CTS flow control is not set. If this occurs, the user should restart at step 3.
DTE timeout	Displayed if the DTE has stopped the XMODEM transfer process before it is finished. If this occurs, the user should restart at step 5.
Code doesn't match hardware	Displayed if the user is attempting to upload a firmware that is not the same model (parallel, serial, etc.), crystal frequency, or size (1Mbit, 2Mbit, etc.) as the firmware that is currently on the board. If this occurs, the FLM will abort and not allow the user to continue.
Device successfully programmed	Displayed by the FLM at the completion of a successful upload or download then the modem will do a cold start.

The flash load module (FLM) has several built in safety mechanisms to reduce the risk of a failed flash upload/download. The FLM will not allow a user to upload a firmware of different model (serial, parallel, etc.) or crystal speed than what is currently in the flash memory. Also, it will not allow the user to upload a firmware that is larger in size than the flash memory itself (e.g., a 2Mbit firmware onto a 1Mbit flash memory). It will, however, allow the user to upload a firmware that is smaller in size than the flash memory, and it will program the firmware with the appropriate offset in order for the firmware to function properly. In the instance that there is a failure during the download or upload process, the modem will be in a "flash rescue mode". In this mode, the modem will respond "OK" to all AT commands, but will only take action on the AT** command, so a new attempt to upload or download can be initiated. When the modem is in the "flash rescue mode" it will only be able to respond to AT commands if the DTE rate has not been changed since the last AT** command was successfully issued, even if the modem is powered off and on.

Uploading NVRAM patch

The NVRAM loader allows NVRAM connected to the modem serial EEPROM bus to be upgraded with custom patch code. This process transfers the modem patch code from the host computer to the modem, which transfers the data to the NVRAM device. Uploading an NVRAM patch to the NVRAM device is a two-step process.

1. When the AT** command is issued, the modem firmware boot loader is invoked and the user will first load the NVRAM loader into the modem's RAM. The data transfer is done via an ASCII transfer. The NVRAM loader contains the programming algorithm for the NVRAM device being programmed.
2. The user will then load the NVRAM patch which the NVRAM loader will then program into the NVRAM device. This transfer is done via ASCII transfer.

Procedure

1. Put the NVRAM loader (e.g. NVM02-16.S37) and the NVRAM patch file (e.g. PatchB3-05-00_NVM.S37) in an appropriate directory on the computer's hard disk.
2. Configure the communications application program for a DTE rate of between 9600 bps and 115200 bps and RTS/CTS flow control.
3. Check the modem for response by typing AT.
4. Initiate the download process using the AT** command. The "Download flash code…" message appears upon issuing the AT** command.
5. Perform an ASCII transfer of the NVRAM loader file (e.g., NVM02-16.S37) from the host computer to the modem RAM using an industry standard communications software or an equivalent process (ensure that all ASCII translation or pacing is turned off).
6. After the NVRAM loader has been loaded perform an AASCI transfer of the NVRAM patch file (e.g., PatchB3-05-00_NVM.s37) from the host computer to the modem RAM using industry standard communications software or an equivalent process.

Uploading SRAM patch

An internal SRAM patch does not require a loader. The AT** command can be used to transfer the SRAM patch directly to the modem's internal RAM. When the AT** command is issued, the modem firmware boot loader is invoked and the user will transfer the SRAM patch into the modem's RAM. The data transfer is done via an ASCII transfer.

Procedure

1. SRAM patch file (e.g. PatchB3-05-00_RAM.S37) in an appropriate directory on the computer's hard disk.
2. Configure the communications application program for a DTE rate of between 9600 bps and 115200 bps and RTS/CTS flow control.
3. Check the modem for response by typing AT.
4. Initiate the download process using the AT** command. The "Download flash code…" message appears upon issuing the AT** command.
5. Perform an AASCI transfer of the SRAM patch file (e.g., PatchB3-05-00_RAM.s37) from the host computer to the modem RAM using industry standard communications software or an equivalent process.

3.2.2 DTE-Modem Interface commands

The parameters defined in this section control the operation of the interface between the DTE and modem.

E - Command Echo

The modem enables or disables the echo of characters to the DTE. The parameter value, if valid, is written to S14 bit 1.

Syntax

E<value>

Defined Values

<value>	Decimal number corresponding to the option.	
	0	Disables command echo.
	1	Enables command echo. (Default.)

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

Q - Quiet Results Codes Control

The command enables or disables the sending of result codes to the DTE. The parameter value, if valid, is written to S14 bit 2.

Syntax

Q<value>

Defined Values

<value>	Decimal number corresponding to the option.	
	0	Enables result codes to the DTE. (Default.)
	1	Disables result codes to the DTE.

Result Codes

OK	<value>= 0 or 1.
ERROR	Otherwise.

V - Result Code Form

This command selects the sending of short-form or long-form result codes to the DTE. The parameter, if valid, is written to S14 bit 3.

Syntax

V<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Enables short-form (terse) result codes. Line feed is not issued before a short-form result code.
1	Enables long-form (verbose) result codes. (Default.)

Result Codes

OK	<value>= 0 or 1.
ERROR	Otherwise.

W - Connect Message Control

This command, in conjunction with S95 bits 0, 2, 3, and 5 (bits 2, 3, and 5 can be written directly by the host or by the +MR, +ER, and +DR commands, respectively), control the format of CONNECT messages (see Section 3.4 and Table 3-16). The actual result code messages reported reflect the W command setting and the S95 bit settings. (Also see +MR, +ER, and +DR commands.)

The W parameter value, if valid, is written to S31 bits 2 and 3.

Syntax

W<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Upon connection, the modem reports only the DTE speed (e.g., CONNECT 19200). Subsequent responses are disabled. (Default.)
1	Upon connection, the modem reports the modulation, line speed, the error correction protocol, and the DTE speed, respectively. Subsequent responses are disabled.
2	Upon connection, the modem reports the DCE speed (e.g., CONNECT 14400). Subsequent responses are disabled.

Result Codes

OK	<value> = 0, 1, or 2.
ERROR	Otherwise.

X - Extended Result Codes

This command selects the subset of the result code messages used by the modem to inform the DTE of the results of commands.

Blind dialing is enabled or disabled by country parameters. If the user wishes to enforce dial tone detection, a "W" can be placed in the dial string (see D command). The information below is based upon the default implementation of the X results table. Table 3-2 indicates the messages which are enabled for each X value.

If the modem is in facsimile mode (+FCLASS=1 or 1.0), the only message sent to indicate a connection is CONNECT without a speed indication.

Syntax

X<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, and NO ANSWER result codes. Blind dialing is enabled/disabled by country parameters. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 000b is written to S22 bits 6, 5, and 4, respectively.

1 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX (XXXX = rate). Blind dialing enabled/disabled by country parameters. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 100b is written to S22 bits 6, 5, and 4, respectively.

2 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIAL TONE, NO ANSWER, and CONNECT XXXX. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO DIAL TONE will be reported instead of NO CARRIER. The value

101b is written to S22 bits 6, 5, and 4, respectively.

3 Enables reporting of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX. Blind dialing is enabled/disabled by country parameters. If dial tone detection is enforced and dial tone is not detected, NO CARRIER will be reported. The value 110b is written to S22 bits 6, 5, and 4, respectively.

4 Enables reporting of busy tones; send all messages. The value 111b is written to S22 bits 6, 5, and 4, respectively. (Default.)

Result Codes

OK	<value> = 0 to 4.
ERROR	Otherwise.

Table 3-2. Result Codes

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
+F4	+FCERROR	x	x	x	x	x	
0	OK	x	x	x	x	x	
1	CONNECT	x	x	x	x	x	
2	RING	x	x	x	x	x	
3	NO CARRIER	x	x	x	x	x	
4	ERROR	x	x	x	x	x	
5	CONNECT 1200	1	x	x	x	x	
6	NO DIAL TONE	3	3	x	x	x	
7	BUSY	3	3	3	x	x	
8	NO ANSWER	x	x	x	x	x	
9	CONNECT 600	1	x	x	x	x	
10	CONNECT 2400	1	x	x	x	x	
11	CONNECT 4800	1	x	x	x	x	
12	CONNECT 9600	1	x	x	x	x	
13	CONNECT 7200	1	x	x	x	x	
14	CONNECT 12000	1	x	x	x	x	
15	CONNECT 14400	1	x	x	x	x	
16	CONNECT 19200	1	x	x	x	x	
17	CONNECT 38400	1	x	x	x	x	
18	CONNECT 57600	1	x	x	x	x	
19	CONNECT 115200	1	x	x	x	x	
20	CONNECT 230400	x	x	x	x	x	
22	CONNECT 75TX/1200RX	1	x	x	x	x	
23	CONNECT 1200TX/75RX	1	x	x	x	x	
24	DELAYED	4	4	4	4	x	
25	MESSAGE-WAITING						
32	BLACKLISTED	4	4	4	4	x	
33	FAX	x	x	x	x	x	
35	DATA	x	x	x	x	x	
39	+MRR: 75	X	X	X	X	X	
40	+MRR: 300	x	x	x	x	x	
42	+MRR: 600	X	X	X	X	X	
44	+MRR: 1200/75	x	x	x	x	x	
45	+MRR: 75/1200	x	x	x	x	x	
46	+MRR: 1200	x	x	x	x	x	
47	+MRR: 2400	x	x	x	x	x	
48	+MRR: 4800	x	x	x	x	x	
49	+MRR: 7200	x	x	x	x	x	
50	+MRR: 9600	x	x	x	x	x	
51	+MRR: 12000	x	x	x	x	x	
52	+MRR: 14400	x	x	x	x	x	
53	+MRR: 16800	x	x	x	x	x	Note 2
54	+MRR: 19200	x	x	x	x	x	Note 2
55	+MRR: 21600	x	x	x	x	x	Note 2
56	+MRR: 24000	x	x	x	x	x	Note 2
57	+MRR: 26400	x	x	x	x	x	Note 2
58	+MRR: 28800	x	x	x	x	x	Note 2
59	CONNECT 16800	1	x	x	x	x	Note 2
61	CONNECT 21600	1	x	x	x	x	Note 2
62	CONNECT 24000	1	x	x	x	x	Note 2

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
63	CONNECT 26400	1	x	x	x	x	Note 2
64	CONNECT 28800	1	x	x	x	x	Note 2
66	+DR: ALT	x	x	x	x	x	
67	+DR: V42B	x	x	x	x	x	
68	+DR: V44	X	X	X	X	X	
69	+DR: NONE	x	x	x	x	x	
70	+ER: NONE	x	x	x	x	x	
77	+ER: LAPM	x	x	x	x	x	
78	+MRR: 31200	x	x	x	x	x	Note 2
79	+MRR: 33600	x	x	x	x	x	Note 2
80	+ER: ALT	x	x	x	x	x	
81	+ER: ALT-CELLULAR	x	x	x	x	x	
81	+ER: ALT - CELLULAR	X	X	X	X	X	
83	LINE IN USE	X	X	X	X	X	
84	CONNECT 33600	1	x	x	x	x	Note 2
85	OFF-HOOK INTRUSION	X	X	X	X	X	
86	LINE REVERSAL DETECTED	X	X	X	X	X	
87	NO LINE	X	X	X	X	X	
91	CONNECT 31200	1	x	x	x	x	Note 2
130	+ILRR						
134	+MCR: B103	x	x	x	x	x	
135	+MCR: B212	x	x	x	x	x	
136	+MCR: V21	x	x	x	x	x	
137	+MCR: V22	x	x	x	x	x	
138	+MCR: V22B	x	x	x	x	x	
139	+MCR: V23	x	x	x	x	x	
139	+MCR: V23C	X	X	X	X	X	
140	+MCR: V32	x	x	x	x	x	
141	+MCR: V32B	x	x	x	x	x	
142	+MCR: V34	x	x	x	x	x	Note 3
145	+MCR: V90	x	x	x	x	x	Note 3
145	+MCR: V90	X	X	X	X	X	
146	+MCR: V92	X	X	X	X	X	
147	+MCR: V29	X	X	X	X	X	
150	+MRR: 32000	x	x	x	x	x	Note 3
151	+MRR: 34000	x	x	x	x	x	Note 3
152	+MRR: 36000	x	x	x	x	x	Note 3
153	+MRR: 38000	x	x	x	x	x	Note 3
154	+MRR: 40000	x	x	x	x	x	Note 3
155	+MRR: 42000	x	x	x	x	x	Note 3
156	+MRR: 44000	x	x	x	x	x	Note 3
157	+MRR: 46000	x	x	x	x	x	Note 3
158	+MRR: 48000	x	x	x	x	x	Note 3
159	+MRR: 50000	x	x	x	x	x	Note 3
160	+MRR: 52000	x	x	x	x	x	Note 3
161	+MRR: 54000	x	x	x	x	x	Note 3
162	+MRR: 56000	x	x	x	x	x	Note 3
165	CONNECT 32000	x	x	x	x	x	Note 3
166	CONNECT 34000	x	x	x	x	x	Note 3
167	CONNECT 36000	x	x	x	x	x	Note 3
168	CONNECT 38000	x	x	x	x	x	Note 3
169	CONNECT 40000	x	x	x	x	x	Note 3
170	CONNECT 42000	x	x	x	x	x	Note 3

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
171	CONNECT 44000	x	x	x	x	x	Note 3
172	CONNECT 46000	x	x	x	x	x	Note 3
173	CONNECT 48000	x	x	x	x	x	Note 3
174	CONNECT 50000	x	x	x	x	x	Note 3
175	CONNECT 52000	x	x	x	x	x	Note 3
176	CONNECT 54000	x	x	x	x	x	Note 3
180	CONNECT 28000	x	x	x	x	x	Note 3
181	CONNECT 29333	x	x	x	x	x	Note 3
182	CONNECT 30667	x	x	x	x	x	Note 3
183	CONNECT 33333	x	x	x	x	x	Note 3
184	CONNECT 34667	x	x	x	x	x	Note 3
185	CONNECT 37333	x	x	x	x	x	Note 3
186	CONNECT 38667	x	x	x	x	x	Note 3
187	CONNECT 41333	x	x	x	x	x	Note 3
188	CONNECT 42667	x	x	x	x	x	Note 3
189	CONNECT 45333	x	x	x	x	x	Note 3
190	CONNECT 46667	x	x	x	x	x	Note 3
191	CONNECT 49333	x	x	x	x	x	Note 3
192	CONNECT 50667	x	x	x	x	x	Note 3
193	CONNECT 53333	x	x	x	x	x	Note 3
194	CONNECT 54667	x	x	x	x	x	Note 3
195	+MRR: 28000	x	x	x	x	x	Note 3
196	+MRR: 29333	x	x	x	x	x	Note 3
197	+MRR: 30667	x	x	x	x	x	Note 3
198	+MRR: 33333	x	x	x	x	x	Note 3
199	+MRR: 34667	x	x	x	x	x	Note 3
200	+MRR: 37333	x	x	x	x	x	Note 3
201	+MRR: 38667	x	x	x	x	x	Note 3
202	+MRR: 41333	x	x	x	x	x	Note 3
203	+MRR: 42667	x	x	x	x	x	Note 3
204	+MRR: 45333	x	x	x	x	x	Note 3
205	+MRR: 46667	x	x	x	x	x	Note 3
206	+MRR: 49333	x	x	x	x	x	Note 3
207	+MRR: 50667	x	x	x	x	x	Note 3
208	+MRR: 53333	x	x	x	x	x	Note 3
209	+MRR: 54667	x	x	x	x	x	Note 3
210	+MRR: 25333	X	X	X	X	X	
211	+MRR: 26667	X	X	X	X	X	
212	+MRR: 25333	X	X	X	X	X	
213	+MRR: 22666	X	X	X	X	X	
214	DIGITAL LINE DETECTED	X	X	X	X	X	

Notes:

1. An 'x' in a column indicates that the message (either the long form if verbose, or the value only for short form) will be generated when that particular value of 'n' (shown at the top of the column) has been selected by the use of ATXn. If the column is blank, then no message will be generated for that x option. A numeral indicates which less explicit message (verbose or short form) will be output for that X option. (Also, see Section 3.3).
2. V.34, V.90, and V.92 models only.
3. V.90 and V.92 models only.

&C - RLSD (DCD) Option

The modem controls the RLSD output in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bit 5.

Syntax

&C<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	RLSD remains ON at all times.
	1	RLSD follows the state of the carrier. (Default.)

Result Codes

OK	0 or 1.
ERROR	Otherwise.

&D - DTR Option

This command interprets the ON to OFF transition of the DTR signal from the DTE in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bits 3 and 4. Also, see S25.

Syntax

&D<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	DTR drop is interpreted according to the current &Qn setting as follows: &Q0, &Q5, &Q6: DTR is ignored (assumed ON). Allows operation with DTEs which do not provide DTR. &Q1: DTR drop causes the modem to hang up. Auto-answer is not affected. &Q2, &Q3: DTR drop causes the modem to hang up. Auto-answer is inhibited.

1	DTR drop is interpreted according to the current &Qn setting as follows: &Q0, &Q1, &Q5, &Q6: DTR drop is interpreted by the modem as if the asynchronous escape sequence had been entered. The modem returns to asynchronous command state without disconnecting. &Q2, &Q3: DTR drop causes the modem to hang up. Auto-answer is inhibited.
2	DTR drop is interpreted according to the current &Qn setting as follows: &Q0 through &Q6: DTR drop causes the modem to hang up. Auto-answer is inhibited. (Default.)
3	DTR drop is interpreted according to the current &Qn setting as follows: &Q0, &Q1, &Q5, &Q6: DTR drop causes the modem to perform a soft reset as if the Z command were received. The &Y setting determines which profile is loaded. &Q2, &Q3: DTR drop causes the modem to hang up. Auto-answer is inhibited.

If &Q5, &Q6, or +FCLASS=1 is in effect, the action taken is the same as for &Q0.

&K - Flow Control

This command defines the DTE/DCE (terminal/modem) flow control mechanism. The parameter value, if valid, is written to S39 bits 0, 1, and 2.

Syntax

&K<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disables flow control.
3	Enables RTS/CTS flow control. (Default for data modem modes.)
4	Enables XON/XOFF flow control.
5	Enables transparent XON/XOFF flow control.

Note: Upon reset, both RTS/CTS and XON/XOFF flow control is enabled for fax modem and voice modes.

Result Codes

OK	<value> = 0, 3, 4, or 5.
ERROR	Otherwise.

&M - Asynchronous/Synchronous Mode Selection

This command determines the DTR operating mode. The modem treats the &M command as a subset of the &Q command.

Syntax

&M<value>

Defined Values

<value> Decimal number corresponding to the selected option.

- 0 Selects direct asynchronous operation. The command sequence &M0\N0 selects normal buffered mode, but the command sequence \N0&M0 selects direct mode. This is because the \N0 command is analogous to the &Q6 command. The value 000b is written to S27 bits 3, 1, and 0, respectively. (See &Q).
- 1 Selects synchronous connect mode with async off-line command mode. The value 001b is written to S27 bits 3, 1, and 0, respectively. (Serial interface operation only.)
- 2 Selects synchronous connect mode with async off-line command mode. Same as &M1 except that &M2 enables DTR dialing of directory slot 0. The modem will disconnect if DTR is OFF for more than the period in S25 (in units of hundredths of a second): the data connection will be synchronous. The value 010b is written to S27 bits 3, 1, and 0, respectively. (Serial interface operation only.)
- 3 Selects synchronous connect mode. This mode allows DTR to act as a talk/data switch. The call is manually initiated while DTR is inactive. When DTR becomes active, the handshake proceeds in originate or answer mode according to S14 bit 7. The value 011b is written to S27 bits 3, 1, and 0, respectively. (Serial interface operation only.)

Result Codes

OK	<value> = 0 to 3
ERROR	Otherwise.

&Q - Sync/Async Mode

This command is an extension of the &M command and is used to control the connection modes permitted. It is used in conjunction with S36 and S48. (Also, see \N.)

NOTE: When the &Q0 to &Q3 command is issued to select the mode, the subsequent connect message will report the DCE speed regardless of the W command and S95 settings.

Syntax

&Q<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Selects direct asynchronous operation. The value 000b is written to S27 bits 3, 1, and 0, respectively. See &M0.
1	Selects synchronous connect mode with async off-line command mode. The value 001b is written to S27 bits 3, 1, and 0, respectively. See &M1. (Serial interface operation only.)
2	Selects synchronous connect mode with async off-line command mode and enables DTR dialing of directory 0. The value 010b is written to S27 bits 3, 1, and 0, respectively. See &M2. (Serial interface operation only.)
3	Selects synchronous connect mode with async off-line command mode and enables DTR to act as Talk/Data switch. The value 011b is written to S27 bits 3, 1, and 0, respectively. See &M3. (Serial interface operation only.)
5	The modem will try to negotiate an error-corrected link. The modem can be configured using S36 to determine whether a failure will result in the modem returning on-hook or will result in fallback to an asynchronous connection. The value 101b is written to S27 bits 3, 1, and 0, respectively. (Default.)
6	Selects asynchronous operation in normal mode (speed buffering). The value 110b is written to S27 bits 3, 1, and 0, respectively.

Result Codes

OK	<value> = 0 to 3, 5, or 6
ERROR	Otherwise.

&R - RTS/CTS Option

This selects how the modem controls CTS. CTS operation is modified if hardware flow control is selected (see &K command). The parameter value, if valid, is written to S21 bit 2.

Syntax

&R<value>

Defined Values

<value> Decimal number corresponding to the selected option.

- 0 In sync mode, CTS tracks the state of RTS; the RTS-to-CTS delay is defined by S26. In async mode, CTS is normally ON and will turn OFF only if required by flow control.
- 1 In sync mode, CTS is always ON (RTS transitions are ignored). tracks the state of RTS; In async mode, CTS is normally ON and will turn OFF only if required by flow control.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

&S - DSR Override

This command selects how the modem will control DSR. The parameter value, if valid, is written to S21 bit 6.

Syntax

&S<value>

Defined Values

<value> Decimal number corresponding to the selected option.

- &0 DSR will remain ON at all times. (Default.)
- &1 DSR will become active after answer tone has been detected and inactive after the carrier has been lost.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

&X - Select Synchronous Clock Source

Selects the source of the transmit clock for the synchronous mode of operation. The parameter value, if valid, is written to S27 bits 4 and 5.

In asynchronous mode, the transmit and receive clocks are turned OFF. In synchronous mode, the clocks are turned ON with the frequency of 1200 Hz or faster corresponding to the speed that is selected for modem operation.

Syntax

&X<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Selects internal timing. The modem generates the transmit clock signal and applies it to the TXCLK output at the serial interface.
1	Selects external timing. The local DTE sources the transmit clock signal on the XTCLK input of the serial interface. The modem applies this clock to the TXCLK output at the serial interface.
2	Selects slave receive timing. The modem derives the transmit clock signal from the incoming carrier and applies it to the TXCLK output at the serial interface.

Result Codes

OK	<value> = 0 to 2.
ERROR	Otherwise.

+IPR - Fixed DTE Rate

This numeric extended-format parameter specifies the data rate at which the modem will accept commands during online operation. It may be used to select operation at rates at which the modem is not capable of automatically detecting the data rate being used by the DTE. Specifying a value of 0 disables the function and allows operation only at rates automatically detectable by the modem. The specified rate takes effect following the issuance of any result code(s) associated with the current command line.

The <rate> specified does not apply in OnLine Data State if Normal Mode (Direct Mode) of operation is selected.

Syntax

+IPR=<rate>

Defined Values

<rate>	Specifies the DTE-modem interface operation rate in bits/s. The available rates are: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400 If unspecified or set to 0, automatic detection is selected and the character format is also forced to autodetect, +ICF=0. If the rate specified is not supported by the modem, an ERROR result code will be returned

Reporting Current or Selected Values

Command:	+IPR?	
Response:	+IPR: <rate>	
Example 1:	+IPR: 0	For automatic rate detection.
Example 2:	+IPR: 115200	For 115200 bps.

Reporting Supported Range of Parameter Values

Command:	+IPR=?
Response:	+IPR (<rate> range)
Example:	+IPR: (0,300,1200,2400,4800,9600,19200,38400,57600,115200, 230400)

+IFC - DTE-Modem Local Flow Control

This extended-format compound parameter controls the operation of local flow control between the DTE and the modem during the data state when V.42 error control is used, or when fallback to non-error control mode is specified to include buffering and flow control. It accepts two numeric subparameters.

Syntax

+IFC=[<modem_by_DTE>[,<DTE_by_modem>]]

Defined Values

<modem_by_DTE> Specifies the method to be used by the DTE to control the flow of received data from the modem.

0	None.
1	XON/XOFF on transmitted data (XON/XOFF on transmit data); do not pass XON/XOFF characters to the remote modem.
2	Circuit 133 (Ready for Receiving). (Default.)
3	DC1/DC3 on circuit 103 (Transmitted Data) with DC1/DC3 characters being passed through to the remote DCE in addition to being acted upon for local flow control

<DTE_by_modem> Specifies the method to be used by the modem to control the flow of transmitted data from the DTE.

0	None.
1	XON/XOFF on received data.
2	CTS/RTS. (Default.)

Reporting Current or Selected Values

Command: +IFC?

Response: +IFC: <modem_by_DTE>,<DTE_by_modem>

Example: +IFC: 2,2 For the defaults.

Reporting Supported Range of Parameter Values

Command: +IFC=?

Response: +IFC: (<modem_by_DTE> range),(<DTE_by_modem> range)

Example: +IFC: (0-3),(0-2)

+ILRR - DTE-Modem Local Rate Reporting

This extended-format numeric parameter controls whether or not the extended-format +ILRR:<rate> information text is transmitted from the modem to the DTE.

Syntax

+ILRR=<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disables reporting of local port rate (+ILRR: is not transmitted). (Default.)
1	Enables reporting of local port rate (+ILRR: is transmitted).

Reporting Current or Selected Values

Command: +ILRR?

Response: +ILRR: <current value>

Example: +ILRR: 0 For the default setting

Reporting Supported Range of Parameter Values

Command: +ILRR=?

Response: +ILRR: (<value> range)

Example: +ILRR: (0,1)

Reported Rate

The <rate> reported represents the current (negotiated or renegotiated) DTE-modem rate. If enabled, the intermediate result code is transmitted after any modulation, error control or data compression reports are transmitted, and before any final result code (e.g., CONNECT) is transmitted. The <rate> is applied after the final result code is transmitted.

The DTE-modem port rate will change only if neither buffered mode nor error controlled means are enabled (+ES=x,0) and if the negotiated carrier rate (+MRR) does not match the current DTE-modem port rate (autodetected from the previous command line).

Syntax

+ILRR: <rate>[,<rx_rate>]

Defined Values

<rate>	Decimal value representing the current (negotiated or renegotiated) DTE-modem rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400
<rx_rate>	Optional decimal value reporting the RXD rate, if it is different from the TXD rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400

Example

+ILRR: 19200

+IBC – In Band Commands

This command provides a mechanism by which an in-band secondary channel may be implemented. This in-band secondary channel can be utilized to transparently exchange commands and responses to/from the modem during a data connection. This is an alternative approach to using the +++ escape sequence. The +IBC command also provides a mechanism to exchange V.24 signaling via the secondary channel. The primary reason the In Band Channel is implemented is to retrieve Caller ID type II information.

The supported In Band Channel command is compatible with the ITU-T V.80 standard but is not a full V.80 implementation. TheV.80 protocol supported is described below. Portions of the V.80 protocol not described are not supported. Please refer Section 7 of the ITU-T V.80 standard for more details.

Syntax

+IBC=<IB>,<105>,<106>,<107>,<108>,<109>,<110>,<125>,<132>,<133>,<135>,<142>,<hook>

Defined Values

<IB>	Enables or disables in-band control sequence.	
	0	Disable in-band control sequences.
	1	Enable 7-bit in-band control sequences. Ignore eighth bit.
	2	Enable 8-bit in-band control sequences.
<105>	Enables or disables V.24 circuit type 105: RTS (Ready to Send).	
	0	Disable in-band reporting for this circuit.
	1	Enable in-band reporting for this circuit.
<106>	Enables or disables the circuit type 106: CTS (Clear to Send).	
	0	Disable in-band reporting for this circuit.
	2	Enable in-band reporting for this circuit.
<125>	Enables or disables the circuit type 125: RI (Ring Indicate).	
	0	Disable in-band reporting for this circuit.
	1	Enable in-band reporting for this circuit.
<other>	Not supported; leave ‘0’ for the unsupported circuit types.	
<hook>	Not supported; leave ‘0’.	

Reporting Current or Selected Values

Command: +IBC?

Response: +IBC=<value>.<value>,<value>,0,0,0,0,<value>,0,0,0,0,0

Example: +IBC=0,0,0,0,0,0,0,0,0,0,0,0,0

Reporting Supported Range of Parameter Values

Command: +IBC=?

Response: +IBC: (0-2),(0-1),(0-1),0,0,0,0,(0-1),0,0,0,0,0)

Entering and Exiting In Band Active State

In Band Command mode will be active only when a modem connection has been made and DCD is on and the modem is not in command mode. Upon a data connection before the connect message is sent, an In Band message will be sent to the DTE to notify that all further data will be EM shielded and should be filtered. Any other time (i.e., command mode or idle mode) the DTE should allow all user data to be in pass-through mode in which the data is unfiltered.

The DTE will receive one of the following active messages:

EM<60h><26h><62h>+IBC:1 to indicate In Band is active and the server is V.92

EM<60h><26h><62h>+IBC:2 to indicate In Band is active and the server is non-V.92

Upon Hang up or escape to command mode, the In Band command mode will end and the DTE should stop filtering EM data and return to pass-through mode.

The DTE will receive the following inactive In Band message:

EM<60h><26h><62h>+IBC:0 to indicate In Band is inactive

EM Shielding Data

When in-band control sequences are enabled, the DTE and the modem must shield and filter data containing EM. In V.80, in-band data is shielded from normal data by an EM character represented by a <19h> or <99h>. If the DTE's data contains an EM, an additional character is inserted.

For example, sending <19h> from the DTE to the modem requires inserting a <singleEM> or <5Ch> into the data stream (e.g., <19h><5Ch>). The modem encodes this as one <19h> in the user data. On the other hand, sending <19h> from the modem to the DTE requires inserting a <singleEM> or <7Ch>. See Table 3-3. Please refer to the V.80 standard for more information.

Table 3-3. Supported V.80 Commands

Command	Hex Codes	Description
Supported V.80 DTE-to-DCE Commands		
<extend0> <length> <control> <rest of command>	<40h> <42h>	The DCE decodes this as a sequence of 3 + (<length>-1Fh).
<105off> <105on>	<42h> <43h>	Circuit 105 is OFF. Circuit 105 is ON.
<singleEMp> <doubleEMp>	<58h> <59h>	The DCE decodes this as one <99h> in user data. The DCE decodes this as <99h><99h> in user data.
<singleEM> <doubleEM>	<5Ch> <5Dh>	The DCE decodes this as on <19h> in user data. The DCE decodes this as <19h><19h> in user data.
<poll>	<5Eh>	The DCE decodes this command and deliver a set of status commands, one for each circuit enabled.
Supported V.80 DCE-to-DTE Commands		
<extend0> <length> <status> <rest of command>	<60h> <62h>	The DCE decodes this as a sequence of 3 + (<length>-1Fh).
<106off> <106on>	<62h> <63h>	Circuit 106 is OFF. Circuit 106 is ON.
<125off> <125on>	<6Ah> <6Bh>	Circuit 125 is OFF. Circuit 125 is ON.
<singleEMp> <doubleEMp>	<76h> <77h>	The DCE encodes this as one <99h> in user data. The DCE encodes this as <99h><99h> in user data.
<singleEM> <doubleEM>	<7Ch> <7Dh>	The DCE encodes this as on <19h> in user data. The DCE encodes this as <19h><19h> in user data.

In band processing of AT commands

When in-band control sequences are enabled, the modem responds to EM shielded AT commands via the extend-0 CONTROL sequence. This command may be used to transmit any AT commands to the modem as follows:

EM <extend-0> <length> <CONTROL> <AT Command without AT and trailing carriage return>

Upon receipt of an in-band command, the modem responds with the extend-0 STATUS REPORT sequence. This sequence will contain the response to the AT command issued via the CONTROL sequence with the trailing <cr> <lf> omitted:

EM <extend-0> <length> <STATUS> <AT Command response without trailing LF>

Example: Send +VRID=2 command to the modem and respond with terse caller ID:

EM <60h> <27h> <42h> +VRID=2

Note: <length> is 27h corresponding to 27h-1Fh=8. This is the length of the sequence following the <length> octet.

The modem responds to this command by transmitting the caller ID information to the DTE via the in-band sequence:

EM <60h> <length> <62h> <raw caller ID information>

EM<60h><22h><62h>OK

In this case, the <length> octet is the actual length of the raw caller ID + 1 + 1Fh.

In band signaling of CTS and Ring Indicate (Circuit 106 and Circuit 125)

Whenever the V.24 circuit selected via the +IBC command changes, the modem will send an unsolicited EM shielded frame to the DTE to inform the DTE of the new state. This is used for CTS and RI. For MOH applications, the DTE is specifically interested in circuit 125 (Ring Indicate).

When RI is asserted, the sequence EM <125on> or 19h 6Bh is sent to the DTE.

When RI is de-asserted, the sequence EM <125off> or 19h 6Ah is sent to the DTE.

3.2.3 Call Control

D - Dial

This command directs the modem to go on-line, dial according to the string entered and attempt to establish a connection. If no dial string is supplied, the modem will go on-line and attempt the handshake in originate mode.

NOTE: If the ATD command is issued before the S1 register has cleared, the modem will respond with the NO CARRIER result code.

If +FCLASS=0 is selected, the modem will behave as a data modem and will attempt to connect to another data modem. The modem will have up to the period of time specified by register S6 or S7 to wait for carrier and complete the handshake. If this time expires before the modem can complete the handshake, the modem will go on-hook with the NO CARRIER response. This command will be aborted in progress upon receipt of any DTE character before completion of the handshake.

If +FCLASS=1 or 1.0 is selected, the modem will behave as a facsimile modem and attempt to connect to a facsimile machine (or modem) by entering the HDLC V.21 channel 2 receive state (as if +FRH=3 had been issued). This command will be aborted upon receipt of any DTE character if the modem has not finished dialing. In this case, the modem will go on-hook and return to command mode after displaying the NO CARRIER message. If the modem has finished dialing, it proceeds as if the +FRH=3 command has been issued. (Refer to the +FRH command to determine how the modem behaves following this stage.)

Dial Modifiers

The valid dial string parameters are described below. Punctuation characters may be used for clarity, with parentheses, hyphen, and spaces being ignored.

Syntax

D<string>

Defined Values

<string> Character string corresponding to the selected option(s).

0-9	DTMF digits 0 to 9.
*	The 'star' digit (tone dialing only).
#	The 'gate' digit (tone dialing only).
A-D	DTMF digits A, B, C, and D. Some countries may prohibit sending of these digits during dialing.
L	Re-dial last number: the modem will re-dial the last valid telephone number. The L must be immediately after the D with all the following characters ignored).
P	Select pulse dialing: pulse dial the numbers that follow until a "T" is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
T	Select tone dialing: tone dial the numbers that follow until a "P" is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
R	This command will be accepted, but not acted on.
S=n	Dial the number stored in the directory (n = 0 to 3). (See &Z.)
!	Flash: the modem will go on-hook for a time defined by the value of S29. Country requirements may limit the time imposed.
W	Wait for dial tone: the modem will wait for dial tone before dialing the digits following "W". If dial tone is not detected within the time specified by S7 (US) or S6 (W-class), the modem will abort the rest of the sequence, return on-hook, and generate an error message.
@	Wait for silence: the modem will wait for at least 5 seconds of silence in the call progress frequency band before continuing with the next dial string parameter. If the modem does not detect these 5 seconds of silence before the expiration of the call abort timer (S7), the modem will terminate the call attempt with a NO ANSWER message. If busy detection is enabled, the modem may terminate the call with the BUSY result code. If answer tone arrives during execution of this parameter, the modem handshakes.

&	Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S7 (US models) or S6 (W-class models), the modem will abort the rest of the sequence, return on-hook, and generate an error message.
,	Dial pause: the modem will pause for a time specified by S8 before dialing the digits following ",".
;	Return to command state. Added to the end of a dial string, this causes the modem to return to the command state after it processes the portion of the dial string preceding the ";". This allows the user to issue additional AT commands while remaining off-hook. The additional AT commands may be placed in the original command line following the ";" and/or may be entered on subsequent command lines. The modem will enter call progress only after an additional dial command is issued without the ";" terminator. Use "H" to abort the dial in progress, and go back on-hook.
^	Toggles calling tone enable/disable: applicable to current dial attempt only.
( )	Ignored: may be used to format the dial string.
-	Ignored: may be used to format the dial string.
<space>	Ignored: may be used to format the dial string.
<i>	Invalid character: will be ignored.
>	If enabled by country specific parameter, the modem will generate a grounding pulse on the EARTH relay output.

T - Set Tone Dial Default

This command forces DTMF dialing until the next P dial modifier or P command is received. The modem will set an S-Parameter bit to indicate that all subsequent dialing should be conducted in tone mode. The DP command will override this command. Clears S14 bit 5.

This command may not be permitted in some countries. (See P.)

Result Code

OK

P - Set Pulse Dial Default

This command forces pulse dialing until the next T dial modifier or T command is received. Sets S14 bit 5.

As soon as a dial command is executed which explicitly specifies the dialing mode for that particular call (e.g., ATDT...), this command is overridden so that all future dialing will be tone dialed. (See T command.)

This command may not be permitted in some countries.

Result Code

OK

A - Answer

The modem will go off-hook and attempt to answer an incoming call if correct conditions are met. Upon successful completion of answer handshake, the modem will go on-line in answer mode. This command may be affected by the state of Line Current Sense, if enabled. (Most countries do not require Line Current Sense.) Operation is also dependent upon +FCLASS command and country-specific requirements.

If +FCLASS=0 is selected, the modem will enter the connect state after exchanging carrier with the remote modem. If no carrier is detected within a period specified in register S7, the modem hangs up. Any character entered during the connect sequence will abort the connection attempt.

If +FCLASS=1 or 1.0 is selected, the modem will go off-hook in V.21 answer mode. It will generate the V.21 2100 Hz answer tone for 3 ± 0.5 seconds and, following a delay of 70 ms, will proceed as if the +FTH=3 command were issued. At any stage up to (but excluding) the +FTH=3 command state, any character will abort the communication. (See the description of the +FTH command for details.)

H - Disconnect (Hang-Up)

This command initiates a hang up sequence.

This command may not be available for some countries due to PTT restrictions.

Syntax

H<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	The modem will release the line if the modem is currently on-line, and will terminate any test (AT&T) that is in progress. Country specific, modulation specific, and error correction protocol specific (S38) processing is handled outside of the H0 command.
1	If on-hook, the modem will go off-hook and enter command mode. For US models, the modem will remain off-hook. For W-class models, the modem will return on-hook after a period of time determined by S7.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

O - Return to On-Line Data Mode

This command determines how the modem will enter the on-line data mode. If in the on-line command mode, the modem enters the on-line data mode with or without a retrain. If in the off-line command mode (no connection), the modem reports ERROR.

Syntax

O<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Enters on-line data mode without a retrain. Handling is determined by the Call Establishment task. Generally, if a connection exists, this command connects the DTE back to the remote modem after an escape (+++).
1	Enters on-line data mode with a retrain before returning to on-line data mode.
2	Fast retrain without speed change (used for diagnostic purpose only).
3	Renegotiate rate without speed change (used for diagnostic purpose only.
4	Renegotiate rate down one speed (used for diagnostic purpose only).
5	Renegotiate rate up one speed (used for diagnostic purpose only).

Result Codes

OK	<value> = 0 to 5 and a connection exists.
ERROR	Otherwise or if not connected.

L - Speaker Volume

This command sets the speaker volume control. The parameter value, if valid, is written to S22 bits 0 and 1.

Syntax

L<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Low volume.
1	Low volume. (Default.)
2	Medium volume.
3	High volume.

Result Codes

OK	<value> = 0 to 3.
ERROR	Otherwise.

M - Speaker Control

This command selects when the speaker will be on or off. The parameter value, if valid, is written to S22 bits 2 and 3.

Syntax

M<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Speaker is always off.
1	Speaker is on during call establishment, but off when receiving carrier. (Default.)
2	Speaker is always on.
3	Speaker is off when receiving carrier and during dialing, but on during answering.

Result Codes

OK	<value> = 0 to 3.
ERROR	Otherwise.

&G - Select Guard Tone

This command causes the modem to generate the guard tone selected by this command (DPSK modulation modes only). The parameter value, if valid, is written to S23 bits 6 and 7.

Syntax

&G<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disables guard tone. (Default.)
	1	Disables guard tone.
	2	Selects 1800 Hz guard tone.

This command may not be permitted in some countries.

Result Codes

OK	<value> = 0 to 2.
ERROR	Otherwise.

&P - Select Pulse Dial Make/Break Ratio

This command determines the make/break ratio used during pulse dialing. It is only effective if the appropriate bit to enable this command is set through the ConfigurACE program. If enabled, it will override the make/break ratios in the OEM parameters in ConfigurACE. The default is country-dependent. The parameter value, if valid, is written to S28 bits 3 and 4.

Syntax

&P<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Selects 39%-61% make/break ratio at 10 pulses per second. (Default.)
	1	Selects 33%-67% make/break ratio at 10 pulses per second.
	2	Selects 39%-61% make/break ratio at 20 pulses per second.
	3	Selects 33%-67% make/break ratio at 20 pulses per second.

Result Codes

OK	<value> = 0 to 3.
ERROR	Otherwise.

&V - Display Current Configuration and Stored Profiles

This command reports the current (active) configuration, the stored (user) profiles, and the first four stored telephone numbers. The stored profiles and telephone numbers are not displayed if the NVRAM is not installed or is not operational as detected by the NVRAM test during reset processing.

Result Code

OK

Example:

```
AT&V
ACTIVE PROFILE:
B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5
&R1 &S0 &T5 &X0
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002
S07:050 S08:002 S09:006
S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:007
S38:020 S46:138
S48:007 S95:000

STORED PROFILE 0:
B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5
&R1 &S0 &T5 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014
S11:095 S12:050 S18:000
S36:007 S40:104 S41:195 S46:138 S95:000

STORED PROFILE 1:
B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5
&R1 &S0 &T5 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014
S11:095 S12:050 S18:000
S36:007 S40:168 S41:195 S46:138 S95:000

TELEPHONE NUMBERS:
0 =      1 =
2 =      3 =

OK
```

&V1 - Display Last Connection Statistics

Displays the last connection statistics in the following format (shown with typical results):

```
TERMINATION REASON.......... LOCAL REQUEST
LAST TX rate................ 26400 BPS
HIGHEST TX rate............. 26400 BPS
LAST RX rate................ 49333 BPS
HIGHEST RX rate............. 49333 BPS
PROTOCOL.................... LAPM
COMPRESSION................. V42Bis
Line QUALITY................ 038
Rx LEVEL.................... 015
Highest Rx State............ 67
Highest TX State............ 67
EQM Sum..................... 00B4
Min Distance................ 0000
RBS Pattern................. 00
Rate Drop................... 00
Digital Loss................ 2000
Local Rtrn Count............ 00
Remote Rtrn Count........... 00
Flex 9481814347C4
```

RBS Pattern: Shows which bits are being robbed in the least significant 6 bytes, e.g., 03 indicates 2 robbed bits in bit positions 0 and 1.

Digital Loss: Shows if a pad was encountered and if so, what was the digital loss. 2000 means 0dB.

Flex: Shows V.8bis information as follows:

First byte: Octet 13 (second byte of manufacturer id, 94 = K56flex)

Second byte: Octet 14 (Licensee code: 81 = Conexant)

Third byte: Octet 15 (manufacturer's product capabilities)

Fourth byte: Octet 16 (K56flex version number)

Fifth byte: Octet 17 (Conexant pump code version number)

Sixth byte: Octet 18 (x-law and controller version number)

Bit 6 Forced/Not forced A-Law/μ-Law

- 0 = Forced A-Law/μ-Law.
- 1 = Not forced A-Law/μ-Law.

Bit 5 Select A-Law or μ-Law

- 0 = Select A-Law.
- 1 = Select μ-Law.

Bit 4:0 Controller version

\V - Single Line Connect Message Enable

This command enables or disables the single line connect message format as follows:

Syntax

\V<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Connect messages are controlled by the command settings X, W, and S95.
1	Connect messages are displayed in the single line format described below subject to the command settings V (Verbose) and Q (Quiet). In Non-Verbose mode (V0), single line connect messages are disabled and a single numeric result code is generated for CONNECT DTE.

When single line connect messages are enabled, there are no CARRIER, PROTOCOL (+ER:), or COMPRESSION (+DR:) messages apart from the fields described below.

The single line connect message format is:

CONNECT <DTE Speed>/<Modulation>/<Protocol>/<Compression>/<Line Speed>

Where:

DTE Speed =	DTE speed, e.g., 57600.
Modulation =	"V92" for V.92 modulation. "V90" for V.90 modulation. "V34" for V.34 modulation. "V32" for V.32 or V.32bis modulation. Note: Modulation is omitted for all other modulations.
Protocol =	"NONE" for no protocol. "ALT" for Microcom Network Protocol. "LAPM" for LAP-M protocol.
Compression =	"V44" for V.44 compression. "V42B" for V.42bis compression. "ALT" for Microcom MNP5 compression. Note: Compression is omitted if protocol is NONE.
Line Speed =	Asymmetric rates are displayed as "/rate:TX/rate:RX", e.g., /1200 TX/75 RX. Symmetric rates are displayed as a single DCE rate, e.g., 14400.

%L - Report Line Signal Level

Returns a value which indicates the received signal level. The value returned is a direct indication (DAA dependent) of the receive level at the MDP, **not** at the telephone line connector. For example, 009 = -9 dBm, 043 = -43 dBm, and so on.

Result Codes

OK

%Q - Report Line Signal Quality

Reports the line signal quality (DAA dependent). Returns the higher order byte of the EQM value. Based on the EQM value, retrain or fallback/fall forward may be initiated if enabled by %E1 or %E2.

Example:

AT%Q

015

Result Codes

OK	If connected.
ERROR	If not connected, or connected in 300 bps, V.23, or fax modes.

*B - Display Blacklisted Numbers

This command requests the modem to return a list of blacklisted numbers to the DTE. The format of the response is shown by the example below. Permanently forbidden numbers as defined by country requirements will not appear on this list. If no numbers are blacklisted, only the OK result code is issued.

Syntax

*B

Example

```
NO. - PHONE NUMBER -
------ ----------------------------
1;  4175537660
2;  8288924961
3;  3887278862
4;  3124839442
5;  6284664


OK
```

*D - Display Delayed Numbers

This command causes the modem to send a list of the delayed numbers together with the delay associated with each. The modem will return a list of delayed telephone numbers as defined in the *B command. The format of the response is shown by the example below (delay times are shown as hours:minutes:seconds). If no numbers are delayed, only the OK result code is issued.

Syntax

*D

Example

```
NO. - PHONE NUMBER -DELAY
------ ------------------------------------------
1;  8264734660     2:00:00
2;  7532634661     2:00:00
3;  2587334662     0:02:00
4;  7532651663     0:03:25
5;  7459931664     0:01:45


OK
```

–PPD= - Extension Pickup Notification through 16550 UART

The –PPD=1 command allows setting of the DDSR (bit 1 of register 6) when an extension pick-up is detected, and disables all DSR notification. The –PPD=0 command disables this feature.

This feature is available only on a SmartSCM that is configured for parallel operation.

–STE= - Set Telephony Extension

The –STE command enables/disables Line In Use, Extension Pickup, and Remote Hangup detection features.

Note: Additional hardware may be required to support these features.

Syntax

-STE=<value>

Defined Values

<value> Decimal number corresponding to the selected bit-mapped options. The bit fields are defined as follows:

Bit 0 Line In Use detection enable/disable.

Bit 1 Extension Pickup detection enable/disable.

Bit 2 Remote Hangup detection enable/disable.

<value> (Dec.)	Remote Hangup	Extension Pickup	Line In Use
0 (default)	Disabled	Disabled	Disabled
1	Disabled	Disabled	Enabled
2	Disabled	Enabled	Disabled
3	Disabled	Enabled	Enabled
4	Enabled	Disabled	Disabled
5	Enabled	Disabled	Enabled
6	Enabled	Enabled	Disabled
7	Enabled	Enabled	Enabled

Reporting Current or Selected Values

Command: -STE?

Response: -STE: <value>

Example: -STE: 4 Remote Hangup enabled, Extension Pickup disabled, and Line In Use disabled.

Reporting Supported Range of Parameter Values

Command: -STE=? Show available options.

Response: -STE: 0-7

Result Codes

OK <value> = 0-7

ERROR Otherwise.

Behavior in Data Mode (+FCLASS=0)

When on-hook, if the line is in use and an ATDT is issued, the modem will not go off-hook and will return with the message LINE IN USE.

When off-hook and either an extension is picked up or a line reversal is detected, the modem will drop the connection. The disconnect reason in register S86=25 (this is also defined for #UD). The user must flash the hook in order to get a dial tone due because the remote server will be retraining.

If the local handset is picked up while the modem is off-hook, the modem will do a link-disconnect, flash the hook for 1.5 seconds, then connect the local handset to the line. At this point, the user dial tone should be on the local handset. The disconnect reason in S86=25.

Behavior in Voice Mode (+FCLASS=8)

When in voice mode and an extension is picked-up, a <DLE>P is sent to the DTE. When the modem is off-hook , a line reversal may also be detected in which case a <DLE>l is sent to the DTE.

In voice mode, there is no blocking of ATDT when the line is in use. Also, there is no automatic hang-up in voice mode as in data mode. There is only the above stated <DLE> shielding event reporting.

Operation in Data Mode

Line In Use (Enabled by AT-STE=1, AT-STE=3, AT-STE=5, or AT-STE=7)

Case 1: Telephone Line is in Use

If an ATDT, ATDP or ATDL is issued while Line In Use detection is enabled and the telephone line is in use, the modem will immediately return the message LINE IN USE to the DTE without going off-hook, and then return to command mode.

Case 2: Telephone Line is in Use But Disconnected

If an ATDT, ATDP or ATDL is issued while Line In Use detection is enabled and the telephone line is NOT in use, the modem will go off-hook after a short pause, then respond with CONNECT or NO CARRIER message.

Case 3: Telephone Line is Not Connected to Modem

If an ATDT, ATDP or ATDL is issued while Line In Use detection is enabled and the telephone line is not connected, the modem will go off-hook momentarily, go back on-hook, then respond with NO LINE message.

Extension Pick-up (Enabled by AT-STE=2, AT-STE=3, AT-STE=6, or AT-STE=7):

Case 1: Modem off-hook, Local Handset Goes Off-Hook

If the local handset goes off-hook while the modem is in a data connection, the local handset will be muted. The modem will then send a GSTN Cleardown to the remote modem and then go on-hook. The modem will then send an OFF HOOK INTRUSION message to the DTE. A result code of 25 will be left in S86 register. After 2 seconds, the local handset will be connected to the telephone line so the user hears the dial tone.

Case 2: Modem off-hook, Extension Pick-up

If the modem is connected and another extension goes off-hook, the modem will send a GSTN Cleardown to the remote modem and then immediately hang-up. Due to the noise possibly being added to the line when a telephone extension is picked-up, a GSTN Cleardown may or may not successfully be received by the remote mode. If the GSTN Cleardown is not received successfully by the remote modem, the remote modem may attempt a retrain until the retrain fails and the remote modem drops the line. In any case, the modem will send an OFF HOOK INTRUSION message to the DTE immediately after sending the GSTN Cleardown. A result code of 25 will be left in the S86 register.

Because the extension is off-hook, the modem cannot flash the hook for the central office to generate a dial tone. In this case, the user must flash the extension handset to obtain a dial tone.

Remote Hang-up (enabled by AT-STE=4, AT-STE=5, AT-STE=6, or AT-STE=7):

Case 1: Modem off-hook, Remote Hang-up

If the modem is connected (off-hook) and the remote modem/server goes hangs up, the central office may issue a line polarity reversal. If a line polarity reversal is detected, the modem will drop the call and respond with NO LINE REVERSAL DETECTED. The reason for hang-up can be determined by #UD or by S86=25. A line reversal can also be simulated by simply pulling out the telephone line during a connection.

Operation in Voice Mode

Line In Use (enabled by AT-STE=1, AT-STE=3, AT-STE=5, or AT-STE=7):

This feature does not apply in voice mode.

Extension Pickup (Enabled by AT-STE=2, AT-STE=3, AT-STE=6, or AT-STE=7)

If the modem is off-hook and an extension goes off-hook, the modem issues a <DLE>P to the DTE. The application software should then hang up the line (VLS=0).

Remote Hang-up (Enabled by AT-STE=4, AT-STE=5, AT-STE=6, or AT-STE=7)

If the modem is off-hook and the remote user goes on-hook, the modem issues a <DLE>P to the DTE. The application software should then hang up the line (VLS=0).

Examples

User is talking on an extension and the modem tries to dial

AT-STE=7

ATDT555-1212

LINE IN USE

The line is not in use and the modem tries to dial

AT-STE=7

ATDT555-1212

Modem goes off-hook

CONNECT

An extension is off-hook but there is silence on the line and the modem tries to dial

AT-STE=3

ATDT555-1212

Modem goes off-hook

NO LINE

Modem is connected in data mode and an extension goes off-hook

AT-STE=2

ATDT555-1212

CONNECT

OFF HOOK INTRUSION — Extension is picked up, GSTN Cleardown sent

ATS86=?

025

Modem is connected in data mode and remote modem goes on-hook

AT-STE=4

ATDT555-1212

CONNECT

OFF HOOK INTRUSION — Remote modem drops line

ATS86=?

025

Modem is connected in data mode and the LOCAL HANDSET goes off-hook

AT-STE=7	
ATDT555-1212	5 sec delay
CONNECT	
LINE REVERSAL DETECTED	Local handset goes off-hook, GSTN Cleardown sent, and remote modem goes on-hook
ATS86=?	
025	
	500 ms after no carrier a dial tone is heard on the local handset

Modem is in answer machine mode and an extension goes off-hook

AT-STE=2	
AT+FCLASS=8	
OK	
<DLE>h	Local handset on-hook
<DLE>R	Ring
AT+VLS=1	
OK	
AT+VSM=1,7200,0,0	
AT+VTX	Starts to play greeting message
<DLE>P	User picks up extension
<DLE>!	DTE send abort to end playback
AT+VLS=0	DTE hangs up

Automated system that needs to periodically use the line while giving the voice user the highest priority

A common use for these features would be an automated system that needs to periodically use the line while giving the voice user the highest priority.

The automated system would make a connection when the line is free. It would do this without disturbing the line if the line is in use. The automated system would periodically retry the connection until the line is free. Once the line is free it would dial and make its connection. If a voice user wishes to use the line while the modem is connected. The modem will drop the line and give the line to the user. The modem will then try to regain control of the line by once again periodically retrying to establish a connection.

AT-STE=7

OK

ATDT5551212

CONNECT

Sometime later, the user picks up phone

NO CARRIER

ATS86?

25

OK

Delay 30 seconds

ATDT5551212

LINE IN USE

Try again some time later user hangs up the phone

CONNECT

-TRV – Tip & Ring Voltage

This command allows the host to read the voltage that the modem sees across Tip & Ring.

Syntax

-TRV

Example

Command: AT-TRV

Response: 1.4

Note: The voltage measurement is read on the opposite of the diode bridge, so the modem assumes and compensates for the voltage drop across 2 diodes. Therefore, if no line is connected, the modem will report 1.4V.

-TTE - Threshold Adjustments for Telephony Extension

This command allows the host to set/tune the telephone extension features for the modem to determine Line In Use, Extension Pickup, Remote Hang-up, and Digital Line Protection and Line Interruption Immunity conditions. An ATZ or AT&F will load default values.

Syntax

-TTE=<Line In Use voltage drop threshold>, <Extension Pickup voltage drop threshold>, <Remote Hang-up voltage drop threshold>, <Digital Line Protection current threshold >, <Line Interruption Immunity >,<RESERVED>

Range: (0-9999) [1], (0-9999) [1], (0-9999) [1], (0-9999), (0-255), (0-255)

Units: 1/10 volt (first three parameters), 1 mA (fourth parameter), 100 ms (fifth parameter)

Defined Values

<Line In Use voltage drop threshold>[1]

1000 = 10.00 V drop while modem is on-hook. (Default.)

<Extension Pickup voltage drop threshold>[1]

150 = 1.50 V drop while modem is off-hook; this value must be less than the Remote Hang-up voltage drop threshold. (Default.)

<Remote Hang-up voltage drop threshold>[1, 2]

500 = 5.00 V drop while modem is off-hook; this value must be greater than the Extension Pickup voltage drop threshold. (Default.)

<Digital Line Protection current threshold>

160 = 160 mA while modem is off-hook (Default.):

<Line Interruption Immunity>

0 = 200 ms (Default.)

1 = 200 ms

2 = 200 ms

n (where n > 2) = n*100 ms

<RESERVED> 056 (Default.)

Reporting Current or Selected Value

Command: AT-TTE? Queries current setting

Notes:

1. Thresholds are difference thresholds. Example: The line would be considered “in use” if the Tip & Ring voltage dropped by 10.00 V. Another Example: If the modem is off-hook and the voltage drops by more than 2.50 V, then the modem would consider the condition as an extension pickup.
2. The <Remote Hang-up voltage drop threshold> must always be less than the <Extension Pickup voltage drop threshold). Otherwise, the extension pickup will not function.

3.2.4 Modulation Control Commands

+MS - Modulation Selection

This extended-format compound parameter controls the manner of operation of the modulation capabilities in the modem. It accepts six subparameters.

Syntax

+MS=[<carrier>[,<automode>[,<min_tx_rate>[,<max_tx_rate>[,<min_rx_rate>[,<max_rx_rate>]]]]]]

Where possible <carrier>, <min_tx_rate>, <max_tx_rate>, <min_rx_rate>, and <max_rx_rate> values are listed in Table 3-4.

Table 3-4. +MS Command Supported Rates

Modulation	<carrier>	Possible (<min_rx_rate>, <min_rx_rate>, (<min_tx_rate>), and <max_tx_rate>) Rates (bps)
Bell 103	B103	300
Bell 212	B212	1200 Rx/75 Tx or 75 Rx/1200 Tx
V.21	V21	300
V.22	V22	1200
V.22 bis	V22B	2400 or 1200
V.23	V23C	1200
V.32	V32	9600 or 4800
V.32 bis	V32B	14400, 12000, 9600, 7200, or 4800
V.34	V34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, or 2400
V.90	V90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
V.92 downstream	V92	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
V.92 upstream	V92	48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000, 26667, 25333, 24000

Defined Values

<carrier> A string which specifies the preferred modem carrier to use in originating or answering a connection. <carrier> values are strings of up to eight characters, consisting only of numeric digits and upper case letters. <carrier> values for ITU standard modulations take the form: <letter><1-4 digits><other letters as needed>. Defined values are listed in Table 3-4.

<automode> A numeric value which enables or disables automatic modulation negotiation (e.g., ITU-T V.32*bis* Annex A or V.8).

- 0 = Automode disabled.
- 1 = Automode enabled. (Default.)

<min_rx_rate> and <max_rx_rate>
Numeric values which specify the lowest (<min_rx_rate>) and highest (<max_rx_rate>) rate at which the modem may establish a receive connection. May be used to condition distinct limits for the receive direction as distinct from the transmit direction. Values for this subparameter are decimal encoded, in units of bit/s. The possible values for each modulation are listed in Table 3-4. Actual values will be limited to possible values corresponding to the entered <carrier> and fall-back <carrier> as determined during operation. (Default = lowest (<min_rx_rate>) and highest (<max_rx_rate>) rate supported by the selected carrier.)

<min_tx_rate> and <max_tx_rate>
Numeric values which specify the lowest (<min_tx_rate>) and highest (<max_tx_rate>) rate at which the modem may establish a transmit connection. Non-zero values for this subparameter are decimal encoded, in units of bit/s. The possible values for each modulation are listed in Table 3-4. Actual values will be limited to possible values corresponding to the entered <carrier> and fall-back <carrier> as determined during operation. (Default = lowest (<min_tx_rate>) and highest (<max_tx_rate>) rate supported by the selected carrier.)

Reporting Current or Selected Values

Command: +MS?

Response: +MS:<carrier>,<automode>,<min_tx_rate>, <max_tx_rate>, <min_rx_rate>,<max_rx_rate>

Note: The current active settings are reported under control of the +MR parameter.

Example: +MS: V92, 1,300,48000,300,56000

For default values. This example allows maximum system flexibility to determine optimal receive and transmit rates during operation.

Reporting Supported Range of Parameter Values

Command: +MS=?

Response: +MS: (< carrier> range),(<automode> range),(<min_tx_rate> range), (<max_tx_rate> range), (<min_rx_rate> range), (<max_rx_rate> range)

Example: +MS:(B103,B212,V21,V22,V22B,V23C,V32,V32B,V34, V90,V92),(0,1),(300-33600),(300-48000),(300-56000),(300-56000)

Result Code

OK	Valid subparameter string
ERROR	Otherwise.

+MR - Modulation Reporting Control

This extended-format numeric parameter controls whether or not the extended-format +MCR:<carrier> and +MRR:<rate> intermediate result codes are transmitted from the modem to the DTE. If enabled, +MCR:<carrier> and +MRR:<rate> intermediate result codes represent the current (negotiated or renegotiated) modulation <carrier> and <rate> that are transmitted at the point during connect negotiation (handshaking) at which the modem has determined which modulation and rate will be used, i.e., before any Error Control or Data Compression reports are transmitted, and before any final result code (e.g., CONNECT) is transmitted.

S95 bit 2 is reset to 0 for +MR=0 and is set to a 1 for +MR=1 or +MR=2. The more recent setting of +MR or S95 bit 2, and the W command setting, determines modulation result code reporting (see S95 Parameter and W Command).

Syntax

+MR=[<value>]

Defined Values

<value> A decimal number corresponding to the selected option:

0	Disables reporting of modulation connection (+MCR: and +MRR: are not transmitted). (Default.)
1	Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with tx rate, rx rate).
2	Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with rx rate only).

Reporting Current or Selected Values

Command: +MR?

Response: +MR: <current value>

Example: +MR: 0 For default setting

Reporting Supported Range of Parameter Values

Command: +MR=?

Response: +MR: (<value>range)

Example: +MR: (0-2)

+MCR: Report Syntax

Response: +MCR: <carrier>

<carrier> Alphanumeric code corresponding to the reported carrier. Defined values are:

B103	For Bell 103
B212	For Bell 212
V21	For V.21
V22	For V.22
V22B	For V.22bis
V23C	For V.23
V32	For V.32
V32B	For V.32bis
V34	For V.34
V90	For V.90
V92	For V.92

+MRR: Report Syntax

Response: +MRR: <tx_rate>,<rx_rate>

<tx_rate>	Decimal transmit rate in bits/s.
<rx_rate>	Decimal receive rate in bits/s.

Example: +MRR: 28800, 48000

%E - Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward

Controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1) or fall back when line quality is insufficient or fall forward when line quality is sufficient (%E2). The parameter value, if valid, is written to S41 bits 2 and 6.

If enabled, the modem attempts to retrain for a maximum of 30 seconds.

Syntax

%E<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disable line quality monitor and auto-retrain.
1	Enable line quality monitor and auto-retrain.
2	Enable line quality monitor and fallback/fall forward. (Default.)

Result Codes

OK	<value> = 0, 1, or 2.
ERROR	Otherwise.

Fallback/Fall Forward. When %E2 is active, the modem monitors the line quality (EQM). When line quality is insufficient, the modem will initiate a rate renegotiation to a lower speed within the V.34/V.32 bis/V.32 (RC336) modulation speeds. The modem will keep falling back within the current modulation if necessary until the speed reaches 2400 bps (V.34) or 4800 bps (V.32). Below this rate, the modem will only do retrains if EQM thresholds are exceeded. If the EQM is sufficient for at least one minute, the modem will initiate a rate renegotiation to a higher speed within the current modulation speeds. The rate renegotiations will be done without a retrain if a V.32 bis connection is established.

Speeds attempted during fallback/fall forward are those shown to be available in the rate sequences exchanged during the initial connection. Fallback/fall forward is available in error correction and normal modes, but not in direct mode or synchronous mode with external clocks.

B - CCITT or Bell

When the modem is configured to allow either option, the modem will select Bell or CCITT modulation for a line speed connection of 300 or 1200 bps. Any other line speed will use a CCITT modulation standard. The parameter value, if valid, is written to S27 bit 6.

Syntax

B<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Selects CCITT operation at 300 or 1200 bps during Call Establishment and a subsequent connection. (Default.)
1	Selects BELL operation at 300 or 1200 bps during Call Establishment and a subsequent connection.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

3.2.5 Error Control Commands

+ES - Error Control and Synchronous Mode Selection

This extended-format command specifies the initial requested mode of operation when the modem is operating as the originator, optionally specifies the acceptable fallback mode of operation when the modem is operating as the originator, and optionally specifies the acceptable fallback mode of operation when the modem is operating as the answerer. It accepts three numeric subparameters:

Syntax

+ES=[<orig_rqst>[,<orig_fbk>[,<ans_fbk>]]]

Defined Values

<orig_rqst> Decimal number which specifies the initial requested mode of operation when the modem is operating as the originator. The options are:

- 0 Initiate call with Direct Mode.
- 1 Initiate call with Normal Mode (also referred to as Buffered Mode) only.
- 2 Initiate V.42 without Detection Phase. If V.8 is in use, disable V.42 Detection Phase.
- 3 Initiate V.42 with Detection Phase. (Default.)
- 4 Initiate MNP.
- 6 Initiate V.80 Synchronous Access Mode when connection is completed, and Data State is entered. (See +ESA and +ITF commands.)
- 7 Initiate Frame Tunneling Mode when connection is complete, and Data Mode is entered.

<orig_fbk> Decimal number which specifies the acceptable fallback mode of operation when the modem is operating as the originator.

- 0 LAPM, MNP, or Normal Mode error control optional. (Default.)
- 1 LAPM, MNP, or Direct Mode error control optional.
- 2 LAPM or MNP error control required; disconnect if error control is not established.
- 3 LAPM error control required; disconnect if error control is not established.
- 4 MNP error control required; disconnect if error control is not established.

<ans_fbk> Decimal number which specifies the acceptable fallback mode of operation when the modem is operating as the answerer or specifies V.80 Synchronous Access Mode.

0	Direct Mode.
1	Error control disabled, use Normal Mode.
2	LAPM, MNP, or Normal Mode error control optional. (Default.)
3	LAPM, MNP, or Direct Mode error control optional.
4	LAPM or MNP error control required; disconnect if error control is not established.
5	LAPM error control required; disconnect if error control is not established.
6	MNP error control required; disconnect if error control is not established.
8	Initiate V.80 Synchronous Access Mode when connection is completed, and Data State is entered (see +ESA and +ITF commands).
9	Initiate Frame Tunneling Mode when connection is complete, and Data Mode is entered.

Examples

+ES=6	Enable V.80 Synchronous Access Mode originator.
+ES=6	Enable V.80 Synchronous Access Mode originator.
+ES=,,8	Enable V.80 Synchronous Access Mode answerer.
+ES=6,,8	Enable V.80 Synchronous Access Mode originator and answerer.
+ES=3	Enable V.42 with Detection Phase originator. Disable V.80 Synchronous Access Mode originator.
+ES=,,2	Allow LAPM, MNP, or Normal Mode connection answerer. Disable V.80 Synchronous Access Mode answerer.
+ES=3,,2	Enable V.42 with Detection Phase originator, allow LAPM, MNP, or Normal Mode connection answer. Disable Synchronous Access Mode originator and answerer.

Reporting Current or Selected Values

Command: +ES?

Response: +ES: <orig_rqst>,<orig_fbk>,<ans_fbk>

Example:	+ES: 3,0,2	For the default setting.
	+ES: 6,0,8	For V.80 Synchronous Access Mode originator and answerer.

Reporting Supported Range of Parameter Values

Command: +ES=?

Response: +ES: (<orig_rqst> range),(<orig_fbk> range), (<ans_fbk> range)

Example: +ES: (0-4,6,7),(0-4),(0-6,8,9)

+EB - Break Handling in Error Control Operation

This extended-format compound parameter controls the break handling in V.42 operation. It accepts three numeric subparameters:

Syntax

+EB=[<break_selection>[,<timed>[,<default_length>]]]

Defined Values

<break_selection>	Decimal number 0 specifying that break is to be ignored, i.e., not signaled to remote DCE.
<timed>	Decimal number 0 specifying that any transmitted V.42 L-SIGNAL will not indicate break signal length
<default_length>	Decimal number 0 specifying that break is not delivered to the DTE.

Reporting Current or Selected Values

Command: +EB?

Response: +EB: <break_selection>,<timed>,<default_length><CR>

Example: +EB: 0,0,0 For default settings.

Reporting Supported Range of Parameter Values

Command: +EB=?

Response: +EB: (<break_selection> range),(<timed> range), (default_length> range)

Example: +EB: (0),(0),(0)

+ESR - Selective Repeat

This extended-format numeric parameter controls the use of the selective repeat (SREJ) option in V.42.

Syntax

+ESR=[<value>]

Decimal number 0 specifying that SREJ is not used.

Reporting Current or Selected Values:

Command: +ESR?

Response: +ESR: <value>

Example: +ESR: 0 For default setting

Reporting Supported Range of Parameter Values:

Command: +ESR=?

Response: +ESR: (<value>)

Example: +ESR: (0)

+EFCS - 32-bit Frame Check Sequence

This extended-format numeric parameter controls the use of the 16-bit or 32-bit frame check sequence (FCS) option in V.42.

Syntax

+EFCS=[<value>]

Defined Values

<value>	Decimal number 0 specifying the use of the 16-bit FCS specified in V.42.

Reporting Current or Selected Values

Command: +EFCS?

Response: +EFCS: <value>

Example: +EFCS: 0 For default setting.

Reporting Supported Range of Parameter Values

Command: +EFCS=?

Response: +EFCS: (<value> range)

Example: +EFCS: (0)

+ER - Error Control Reporting

This extended-format numeric parameter controls whether or not the extended-format +ER: intermediate result code is transmitted from the modem to the DTE.

S95 bit 3 is reset to 0 for +ER=0 and is set to a 1 for +ER=1. The more recent setting of +ER or S95 bit 3, and the W command setting, determines the actual error control result code reporting (see S95 Parameter and W Command).

+ER=[<value>]

Syntax

+ER=[<value>]

Defined Values

<value> A decimal number corresponding to the selected error control option:

- 0 = Error control reporting disabled (no +ER intermediate result code transmitted). (Default.)
- 1 = Error control reporting enabled (+ER intermediate result code transmitted).

Reporting Current or Selected Values

Command: +ER?

Response: +ER: <current value>

Example: +ER: 0 for the default setting

Reporting Supported Range of Parameter Values

Command: +ER=?

Response: +ER: (<value> range)

Example: +ER: (0,1)

+ER: <type>

The +ER: <type> reported represents the current (negotiated or renegotiated) modem-modem error control type. If enabled, the intermediate result code is transmitted at the point during error control negotiation (handshaking) at which the modem has determined which error control protocol will be used (if any), before the final result code (e.g., CONNECT) is transmitted. The format of this result code is:

The +ER intermediate result code, if enabled, is issued after the Modulation report (+MCR and +MRR) and before the Data Compression Report (+DR).

Syntax

+ER: <type>

Defined Values

<type> An alphanumeric code corresponding to the selected protocol.

NONE	Error control is not in use.
LAPM	V.42 LAPM protocol is in use.
ALT	MNP is in use.

Example

+ER: LAPM

+ETBM - Call Termination Buffer Management

This extended-format compound parameter controls the handling of data remaining in modem buffers upon call termination. It accepts three numeric subparameters:

Syntax

+ETBM=[<pending_TD>[,<pending_RD>[,<timer>]]]

Defined Values

<pending_TD>	Decimal number 0 specifying that disconnect will occur immediately and all buffered transmit data will be discarded when the local DTE requests call disconnection.
<pending_RD>	Decimal number 0 specifying that disconnect will occur immediately and all buffered receive data will be discarded when the local DTE requests call disconnection.
<timer>	Decimal number 0 specifying that the modem will not attempt to deliver the buffered data before abandoning the attempt and discarding remaining data.

Reporting Current or Selected Values

Command: +ETBM?

Response: +ETBM: <pending_TD>,<pending_RD>,<timer>

Example: +ETBM: 0,0,0

Reporting Supported Range of Parameter Values

Command: +ETBM=?

Response: +ETBM: (<pending_TD> range),(<pending_RD> range), (<timer> range)

Example: +ETBM: (0),(0),(0)

\B - Transmit Break to Remote

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100 ms according to parameter specified. If a number in excess of 9 is entered, 9 is used. The command works in conjunction with the \K command.

In error correction mode, the modem will signal a break through the active error correction protocol, giving no indication of the length.

Syntax

\B<value>

Defined Values

<value>	Decimal number corresponding to the selected option.
1-9	Break length in 100 ms units. (Default = 3.) (Non-error corrected mode only.)

Result Codes

OK	If connected in data modem mode.
NO CARRIER	If not connected or connected in fax modem mode.

Note: When the modem receives a break from the remote modem, break is passed to the DTE as follows: In non-error correction mode direct, the break length is passed; in non-error correction mode normal and in error correction mode, a 300 ms break is passed.

\K - Break Control

Controls the response of the modem to a break received from the DTE or the remote modem or the \B command. The parameter value, if valid, is written to S40 bits 3, 4, and 5.

Syntax

\K<value>

Defined Values

<value> Decimal number corresponding to the selected option.

The response is different in three separate states.

The **first state** is where the modem receives a break from the DTE when the modem is operating in data transfer mode:

- 0 Enter on-line command mode, no break sent to the remote modem.
- 1 Clear data buffers and send break to remote modem.
- 2 Same as 0.
- 3 Send break to remote modem immediately.
- 4 Same as 0.
- 5 Send break to remote modem in sequence with transmitted data. (Default.)

The **second case** is where the modem is in the on-line command state (waiting for AT commands) during a data connection, and the \B is received in order to send a break to the remote modem:

- 0 Clear data buffers and send break to remote modem.
- 1 Clear data buffers and send break to remote modem. (Same as 0.)
- 2 Send break to remote modem immediately.
- 3 Send break to remote modem immediately. (Same as 2.)
- 4 Send break to remote modem in sequence with data.
- 5 Send break to remote modem in sequence with data. (Same as 4.) (Default.)

The third case is where a break is received from a remote modem during a non-error corrected connection:

0	Clears data buffers and sends break to the DTE.
1	Clears data buffers and sends break to the DTE. (Same as 0.)
2	Send a break immediately to DTE.
3	Send a break immediately to DTE. (Same as 2.)
4	Send a break in sequence with received data to DTE.
5	Send a break in sequence with received data to DTE. (Same as 4.) (Default.)

Result Codes

OK	0 to 5.
ERROR	Otherwise.

-K - MNP Extended Services

Enables or disables conversion of a V.42 LAPM connection to an MNP 10 connection. The parameter value, if valid, is written to S40 bits 0 and 1.

Syntax

-K<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disables V.42 LAPM to MNP 10 conversion. (Default.)
1	Enables V.42 LAPM to MNP 10 conversion.
2	Enables V.42 LAPM to MNP 10 conversion; inhibits MNP Extended Services initiation during V.42 LAPM answer mode detection phase.

Result Codes

OK	0 or 2.
ERROR	Otherwise.

3.2.6 Data Compression Commands

This section contains parameters to condition modem use of standard ITU-T V.42*bis* Data Compression Procedures.

+DS - Data Compression

This extended-format compound parameter controls the V.42bis data compression function if provided in the modem. It accepts four numeric subparameters:

Syntax

+DS=[<direction>[,<compr_neg>[,<max_dict>[,<max_string>]]]]

Defined Values

<direction> Specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.

- 0 Negotiated; no compression (V.42bis P0=0).
- 3 both directions, accept any direction (V.42bis P0=11). (Default.)

<compr_neg> Specifies whether or not the modem should continue to operate if the desired result is not obtained.

- 0 Do not disconnect if V.42bis is not negotiated by the remote modem as specified in <direction>.

<max_dict> Specifies the maximum number of dictionary entries (2048 entries) which should be negotiated (may be used by the DTE to limit the codeword size transmitted, based on its knowledge of the nature of the data to be transmitted).

<max_string> Specifies the maximum string length (32 bytes) to be negotiated (V.42bis P2).

Reporting Current or Selected Values

Command: +DS?

Response: +DS: <direction>,<compr_neg>,<max_dict>,<max_string>

Example: +DS: 3,0,2048,32 for the defaults and 2048 entry max dictionary.

Reporting Supported Range of Parameter Values

Command: +DS=?

Response: +DS: (<direction> range),(< compr_neg > range), (<max_dict> range),(<max_string> range)

Example: +DS: (0,3),(0),(2048),(32)

+DS44 - V.44 Compression Select

This extended-format compound parameter controls the V.44 data compression function.

Syntax

+DS44=[<direction>[,< compress_negotiation >[,<capability>[,<max_codewords_tx>[,<max_codewords_rx>[,<max_string_tx>[,<max_string_rx>[,<max_history_tx>[,<max_history_rx>]]]]]]]]

Defined Values

<direction> Decimal number that specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.

- 0 Negotiated, no compression.
- 1 Transmit only.
- 2 Receive only.
- 3 Both directions, accept any direction. (Default.)

<compress_negotiation> Decimal number that specifies whether or not the modem should continue to operate if the desired result is not obtained.

- 0 Do not disconnect if V.44 is not negotiated by the remote DCE as specified in <direction>. (Default.)
- 1 Disconnect if V.44 is not negotiated by the remote DCE as specified in <direction>.

<capability> Decimal number that specifies the use of stream method, packet method, multi-packet method.

- 0 Stream method. (Default.)
- 1 Packet method.
- 2 Multi-packet method.

<max_codewords_tx> Decimal number from 256 to 2048 that specifies the maximum number of codewords which should be negotiated in the transmit direction. (Default = 2048.)

<max_codewords_rx> Decimal number from 256 to 2048 that specifies the maximum number of codewords which should be negotiated in the receive direction. (Default = 2048.)

<max_string_tx> Decimal number from 32 to 255 that specifies the maximum string length to be negotiated in the transmit direction. (Default = 32.)

<max_string_rx> Decimal number from 32 to 255 that specifies the maximum string length to be negotiated in the receive direction. (Default = 32.)

<max_history_tx> Decimal number from 2048 to 4096 that specifies the maximum size of the history buffer to be negotiated in the transmit direction. (Default = 4096.)

<max_history_rx> Decimal number from 2048 to 4096 that specifies the maximum size of the history buffer to be negotiated in the receive direction. (Default = 4096.)

Reporting Current or Selected Values

Command: +DS44?

Response: +DS44:<direction>,<compression_negotiation>,<capability>, <max_codewords_tx>,<max_codewords_rx>,<max_string_tx>, <max_string_rx>,<max_history_tx>,<max_history_rx>

Example: +DS44:3,0,0,2048,2048,32,32,4096,4096 For the default setting.

Reporting Supported Range of Parameter Values

Command: +DS44=?

Response: +DS44:(list of supported <direction> values),(list of supported <compression_negotiation> values),(list of supported <capability> values),(list of supported <max_codewords_tx> values),(list of supported <max_codewords_rx> values),(list of supported <max_string_tx> values),(list of supported <max_string_rx> values),(list of supported <max_history_tx> values),(list of supported <max_history_rx> values)

+DR - Data Compression Reporting

This extended-format numeric parameter controls whether or not the extended-format +DR: intermediate result code is transmitted from the modem to the DTE.

S95 bit 5 is reset to 0 for +DR=0 and is set to a 1 for +DR=1. The more recent setting of +DR or S95 bit 5, and the W command setting, determines the actual data compression result code reporting (see S95 Parameter and W Command).

Syntax

+DR=[<value>]

Defined Values

<value> decimal number corresponding to the selected option:

0	Data compression reporting disabled (no +DR result code transmitted).
1	Data compression reporting enabled (+DR result code transmitted). (Default.)

Reporting Current or Selected Values

Command: +DR?

Response: +DR: <current value>

Example: +DR: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: +DR=?

Response: +DR: (<value> range)

Example: +DR: (0,1)

+DR: <type> Intermediate Result Code

The +DR: <type> reported represents the current (negotiated or renegotiated) modem-modem data compression type. If enabled, the intermediate result code is transmitted at the point after error control negotiation (handshaking) at which the modem has determined which data compression technique will be used (if any) and the direction of operation. The +DR intermediate result code, if enabled, is issued after the Error Control Report (+ER) and before the final result code (e.g., CONNECT).

The format of this result code is:

Result Code Syntax

+DR: <type>

Defined Values

<type> An alphanumeric code corresponding to the selected option:

NONE	Data compression is not in use.
V42B	V.42bis is in use in both directions.
V42B RD	V.42 bis is in use in receive direction only
V42B TD	V.42 bis is in use in transmit direction only
V44	V.44 is in use in both directions
V44 RD	V.44 is in use in receive direction only
V44 TD	V.44 is in use in transmit direction only
ALT	MNP 5 compression.

Example

+DR: V42B

%C - Enable/Disable Data Compression

Enables or disables data compression negotiation. The modem can only perform data compression on an error corrected link. The parameter value, if valid, is written to S41 bits 0 and 1.

Syntax

%C<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disables data compression. Resets S46 bit 1.
1	Enables MNP 5 data compression negotiation. Resets S46 bit 1.
2	Enables V.42 bis data compression. Sets S46 bit 1.
3	Enables both V.42 bis and MNP 5 data compression. Sets S46 bit 1. (Default.)

Result Codes

OK	<value> = 0, 1, 2, or 3.
ERROR	Otherwise.

3.2.7 V.8/V.8bis Commands

+A8E - V.8 and V.8bis Operation Controls

This command is defined for two conditions: as a parameter while the modem is on-hook, and as an action command while the modem is off-hook. If enabled, V.8 negotiation does not preclude simultaneous implementation of other negotiation means (e.g., V.8bis, V.18, V.32bis Annex A).

This command is a compound parameter if issued while the modem is on-hook, used to precondition V.8 and V.8bis originating and answering operation. It is issued by the DTE before the Dial (D) or Answer (A) command, regardless of the state of the +FCLASS parameter.

This command is an action command if issued while the modem is off-hook, to (re)start V.8 or V.8bis negotiation. For example, if initial V.8 negotiation failed, but subsequent T.30 negotiation indicated V.8 capability, this command may be used to initiate V.8 negotiation.

Syntax

+A8E=<v8o>,<v8a>,<v8cf>[,<v8b>][,<cfrange>][,<protrange>]

Defined Values

<v8o> Decimal number which enables/disables issuance of +A8*x* indications during modem-controlled V.8 origination negotiation.

- 1 Enable DCE-controlled V.8 origination negotiation without +A8x indications. (Default.)
- 6 Enable DCE-controlled V.8 origination negotiation with +A8x indications.

<v8a>= Decimal number which enables/disables issuance of +A8*x* indications during modem-controlled V.8 answer negotiation.

- 1 Enable DCE-controlled V.8 answer negotiation without +A8x indications. (Default.)
- 5 Enable DCE-controlled V.8 answer negotiation with +A8x indications.

<v8cf>= Set the V.8 CI signal call function to the hexadecimal octet XY.

- 00 (Default.)
- 21
- C1

<v8b>= Decimal number which enables/disables V.8bis negotiation.

- 0 Disable V.8bis negotiation.
- 1 Enable V.8bis negotiation. (Default.)

<cfrange>= "<string of values>". Applicable only for <v8a>=5. Not supported.

< protrange >= "<string of values>". Applicable only for <v8a>=5. Not supported.

Default values: 1,1,00,1,0,0

The ATD and ATA commands behave as specified in V.250, and +A8n indications are not generated by the modem.

For subparameter values <v8o>=6 and <v8a>=5, the +A8I indications are issued during the course of the V.8 session to notify the DTE when the relevant V.8 signals are received.

Reporting Current or Selected Values

Command: +A8E?

Response: +A8E: <v8o>,<v8a>,<v8cf>[,<v8b>][,<cfrange>][,<protrange>]

Example: +A8E: 1,1,00,1,0,0 For the defaults

Reporting Supported Range of Parameter Values

Command: +A8E=?

Response: +A8E: (<v8o> range),(<v8a> range),(v8cf in octets),
(<v8b> range),(<cfrange>),(<protrange>)

Example: +A8E: (1,6),(1,5),(0,21,C1),(0,1),(0),(0)

+A8I: - CI Signal Indication

This indication is issued by an answering modem, if +A8E,<v8a> ≠ 0, to indicate detection of a V.8 CI signal, and report the recovered Call Function octet(s).

Indication Syntax

+A8I:<v8cf><CR>

Defined Values

<v8cf>	A hexadecimal code octet representation of those Call Function octet(s). +A8I:0 indicates that the modem timed out waiting for CI.

Example

+A8I:0	The modem timed out waiting for CI.
+A8I:X	YYY

3.2.8 Synchronous Access Mode Commands

Three commands support Synchronous Access Mode:

+ES	Enables and disables Synchronous Access Mode in the client or central site modem (see 0)
+ESA	Configures the operation of the Synchronous Access Submode
+ITF	Selects Transmit Flow Control Thresholds

Enabling Synchronous Access Mode enables the use of the 8-bit command characters defined in Table 9/V.80 of the Draft ITU-T Recommendation V.80 (DATA COMMUNICATION OVER THE TELEPHONE NETWORK; In-Band DCE Control and Synchronous Data Modes for Asynchronous DTE).

+ESA - Configure Synchronous Access Submode

The operation of the Synchronous Access sub-Mode is configured by the +ESA parameter.

This extended-format compound parameter is used to control the manner of operation of the Synchronous Access Mode in the modem. It accepts six numeric subparameters:

Syntax

+ESA=[<trans_idle>[,<framed_idle>[,<framed_un_ov>[,<hd_auto>[,<crc_type>[,<nrzi_en>[,<syn1>[,<syn2>]]]]]]]]

Defined Values

<trans_idle> Specifies the bit sequence transmitted by the modem when a transmit data buffer underrun condition occurs, while operating in Transparent sub-Mode. The options are:

- 0 In Transparent sub-Mode, modem transmits 8-bit SYN sequence on idle. Modem receiver does not hunt for synchronization sequence (default and fixed).

<framed_idle> Specifies the bit sequence transmitted by the modem when a transmit data buffer underrun condition occurs immediately after a flag, while operating in Framed sub-Mode. The options are:

- 0 In Framed sub-Mode, modem transmits HDLC flags on idle (default and fixed).

<framed_un_ov> Specifies the actions undertaken by the modem when a transmit data buffer underrun or overrun condition occurs immediately after a non-flag octet, while operating in Framed sub-Mode.

- 0 In Framed sub-Mode, modem transmits abort on underrun in middle of frame (default).
- 1 In Framed sub-Mode, DCE transmits a flag on underrun in middle of frame, and notifies DTE of underrun or overrun.

<hd_auto>	Specifies whether or not, in V.34 half-duplex operation, additional procedures besides those specified in § 12/V.34 shall be performed by the modem when switching from primary channel to secondary channel operation, and vice versa. This subparameter should not be commanded.
<crc_type>	Specifies the CRC polynomial used while operating in Framed sub-Mode. The options are: 0 CRC generation and checking disabled (default). 1 In Framed sub-Mode, the 16-bit CRC is generated by the modem in the transmit direction, and checked by the modem in the receive direction.
<nrzi_en>	Specifies if Non Return to Zero Inverted (NRZI) encoding is to be used by the modem for transmit and receive data. The options are: 0 NZRI encoding and decoding disabled (default and fixed).
<syn1>, <syn2>	Specifies the octet value(s) to be used while performing character-oriented framing. <syn1> is to be commanded to 255 (FFh); <syn2> is not to be commanded.

Reporting Selected Options

The modem reports the selected options in response to the following command:

+ESA?

The response is:

+ESA:
<trans_idle>,<framed_idle>,<framed_un_ov>,<hd_auto>,<crc_type>,<nrzi_en>,<syn1>,<syn2>

Example:

+ESA?

+ESA: 0,0,0, ,0,0,255, For the defaults.

Reporting Supported Options

The modem reports the supported options in response to the following command:

+ESA=?

The response is:

+ESA: (list of supported <trans_idle> values), (list of supported <framed_idle> values),(list of supported <framed_un_ov> values), (list of supported <hd_auto> values),(list of supported <crc_type> values), (list of supported <nrzi_en> values), (list of supported <syn1> values), (list of supported <syn2> values)

Example:

+ESA=?

+ESA: (0),(0),(0-1), ,(0-1),(0),(255),

+H - Enable/Disable RPI

This command enables or disables Conexant Protocol Interface (RPI) processing and sets the DTE speed.

Syntax

+H=<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disable protocol interface and video ready mode.
1	Enable RPI mode and set DTE speed to 19200 bps.
2	Enable RPI mode and set DTE speed to 38400 bps.
3	Enable RPI mode and set DTE speed to 57600 bps.
11	Enable RPI+ mode. When in RPI+ mode, a link is established between the modem and the WinRPI or WinRPI95 host PC software driver to allow the modem to support protocol (V.42bis/LAP-M/MNP2-5) connections with a remote modem. This command should only be used when the WinRPI or WinRPI95 driver software is installed in the PC.
16	Reserved.
17	Reserved.

Result Codes

OK	0 to 3, 11, 16, 17
ERROR	Otherwise.

+ITF - Transmit Flow Control Thresholds

The +ITF command determines the flow control thresholds used by the modem for transmit data from the DTE.

This optional compound parameter allows the DTE to determine the input buffer size in the modem for data on circuit 103 (transmit data) from the DTE, to control the thresholds used for flow control of such data, and to control how often the modem reports to the DTE the number of octets in this buffer. The DTE can adjust its own thresholds for flow control of data on circuit 104 (received data) from the modem.

Syntax

+ITF=[<off>[,<on>[,<report_period>]]]

Defined Values

<off>	Determines the threshold, in octets, above which the modem will generate a flow off signal. Applicable in Synchronous Access and Frame Tunneling modes. Default <off> value is 255. For the <on> and <off> subparameters, the input buffer is assumed to reside between the modem's V.24 interface and the Synchronous Access protocol layer; i.e., the buffer count includes all octets, including EM codes, received from the DTE, with the exception of DC1 and DC3 if these are used to signal <modem-by-DTE> flow control. The modem returns the ERROR result code if the DTE specifies that the <off> subparameter be set to a value less than or equal to the <on> subparameter; in this case, the current parameter value settings are not modified.
<on>	Determines the threshold, in octets, below which the modem will generate a flow on signal. Applicable in Synchronous Access and Frame Tunneling modes. Default <on> value is 64.
<report_period>	Not supported. A fixed value of zero is used and reported.

Reporting Selected Options

The modem sends a string of information text to the DTE consisting of selected options in response to the following command:

+ITF?

The response is:

+ITF: <off>,<on>,<report_period>

Example:

+ITF?

+ITF: 255,64,0 Default values

Reporting Supported Options

The modem sends a string of information text to the DTE consisting of supported options in response to the following command:

+ITF=?

The response is:

+ITF: (list of supported <off> values),(list of supported <on> values),(list of supported <report_period> values)

Example:

+ITF=?

+ITF: (0-255),(0-255),(0)

The maximum reported <off> value is the input transmit data buffer level at which the modem signals a transmit data overrun indication to the DTE.

3.2.9 Diagnostic Commands

#UD – Last Call Status Report

#UD is an action command requesting reporting of logged operation events. It does not take parameters and must be the last command in the command line.

The modem logs aspects of their operation for each call, and saves these results until cleared by one of the following events:

1. Power off.
2. Hard reset (e.g., negate DTR with &D3 set; reset button).
3. Soft reset = ATZ or AT&F.
4. ATD command issued.
5. ATA command issued.
6. Automatic answer (e.g., set register S0>0 and ring detected).

These results are NOT cleared by changing DTR, V.24 circuit 108.2, if &D0, &D1 or &D2.

Data Call State Model

For purposes of this command, there are four data call states, and associated status issues:

- Call Setup
  - Calling DCE: get dial tone, generate dial digits, detect call progress signals.
  - Answering DCE: detect ringing, detect CallerID, etc.
- Negotiation
  - V.25 calling tone/answer tone exchanges
  - V.8 or V.8bis call function negotiations
  - V-series modem carrier detection and training
  - Modem-to-modem protocols (e.g., V.42, V.42bis).
- Data Transfer
  - Bit-error rates, for each direction
  - Rate renegotiation
  - Retraining
- Call Termination
  - protocol disconnect signals
  - carrier disconnect signals
  - loss of carrier
  - excessive error rates

Command Syntax

In response to this command, the modem will report one or more lines of information text as defined below. Information text format conforms to V.250; each line is preceded by a <CR><LF> pair, and terminated by <CR><LF>. (CR and LF characters may be changed by writing new values to the contents of registers S3 and S4, respectively.)

The modem may generate a single line or multiple lines, followed by a standard OK final result code. For example, if call setup failed, only that result is useful. Each information text line is formatted as follows, including one or more key=value pairs:

Syntax

#UD

Response

DIAG <token key=value [[key=value] [key=value]] …>

Defined Values

DIAG	5 hexadecimal characters (44h, 49h, 41h, 47h, 20h)
<	Left angle bracket (less than sign) (3Ch)
token	Unique 32-bit hexadecimal string `2A4D3263` (32h, 4h1, 34h, 44h, 33h, 32h, 36h, 33h)
space	space character (20h)
Key	One- or two-digit hexadecimal number (see Key in Table 3-5)
=	Equal sign (3Dh)
Value	Any string as defined below (Table 3-5 - Table 3-10 as appropriate)
>	Right angle bracket (greater than sign) (3Eh)

Unless otherwise noted, all values are hexadecimal numbers. Any numeric values from tables in ITU V.58 are converted to hexadecimal. Multi-digit values are reported MSD first. Leading 0's may be deleted. See examples in Table 3-14.

Monitoring an active connection

This command is intended for use after call termination. However, codes are defined so that a modem can respond before the first call is placed, and during a call for live monitoring purposes. For example, key 60, call termination, has value 1 defined, indicating that the call is still in progress.

There are at least two ways to do this. First, the DTE could switch the modem to On-Line command state, issue the command, capture the responses and then issue an ATO command. For smoother on-line monitoring, in-band means defined in ITU V.80 are recommended if available in the modem. If V.80 methods are used, each response line shall be a separate extended in-band message.

Notes for Tables

1. The modem may insert a delay (e.g., 10 ms) between information text lines.
2. The code tables include values for data and fax calls. Some of the codes are applicable only to data calls (e.g., data compression), some are applicable only to call origination (e.g., busy, answering signal detection) and some are applicable only to the answering modem (e.g., calling signal detection).

callCleared codes from 3.6.4/V.58-1994

callCleared: indicates that the DCE has gone on-hook and that the previously existing network connection has been cleared. These value are hex, converted from decimal in V.58. callCleared codes are described in Table 3-13.

Table 3-5. AT#UD Last Call Status Report Format

Key	Value(s)	Definition
0	2 digits	Diagnostic Command Specification revision number, digit.digit
1	Table 3-6	Call Setup Result code
2	Table 3-7	Multi-media mode
3	Table 3-8	DTE-DCE interface mode
4	String	V.8 CM octet string, same format as V.250, in quotes
5	String	V.8 JM octet string, same format as V.250, in quotes
10	0-2F	Received signal power level, in –dBm (0-43)
11	0-1F	Transmit signal power level, in –dBm (e.g., 0-17)
12	0-64	Estimated noise level, in –dBm (e.g., 10-90)
17	0-FFF	Round Trip delay, in units of ms
18	Table 3-9	V.34 INFO bit map
20	Table 3-10	Transmit Carrier Negotiation Result
21	Table 3-10	Receive Carrier Negotiation Result
22	0-1F40	Transmit Carrier symbol rate (0-8000) in symbol/s
23	0-1F40	Receive Carrier symbol rate (0-8000) in symbol/s
24	0-FA0	Transmit Carrier frequency (0-4000) in Hz
25	0-FA0	Receive Carrier frequency (0-4000) in Hz
26	0-FA00	Initial transmit carrier data rate (0-64000) in bit/s
27	0-FA00	Initial receive carrier data rate (0-64000) in bit/s
30	0-FF	Temporary carrier loss event count
31	0-FF	Carrier Rate re-negotiation event count
32	0-FF	Carrier Retrains requested
33	0-FF	Carrier Retrain requests granted
34	0-FA00	Final transmit carrier data rate in bit/s
35	0-FA00	Final receive carrier data rate in bit/s
40	Table 3-11	Protocol Negotiation Result
41	0-400	Error Control frame size in bytes
42	0-FF	Error control link timeouts in transmission
43	0-FF	Error control link NAKs received
44	Table 3-12	Compression Negotiation Result
50	0-2	Transmit flow control: 0 = off; 1 = DC1/DC3; 2 = V.24 circuit 106/133
51	0-2	Receive flow control: 0 = off; 1 = DC1/DC3; 2 = V.24 circuit 106/133
52	0-FFFFFFFF	Transmit characters sent from DTE
53	0-FFFFFFFF	Received characters sent to DTE
54	0-FFFF	Transmit characters lost (data overrun errors from DTE)
55	0-FFFF	Received characters lost (data overrun errors to DTE)
56	0-FFFFFFFF	Transmit I- Frame count, if error control protocol running
57	0-FFFFFFFF	Received I-Frame count, if error control protocol running
58	0-FFFF	Transmit I-Frame error count, if error control protocol running
59	0-FFFF	Received I- Frame error count, if error control protocol running
60	Table 3-13	Termination Cause
61	0-FF	Call Waiting event count

Table 3-6. Call Setup Result Codes

Code	Definition
0	No previous call (modem log has been cleared since any previous calls)
1	No dial tone detected
2	Reorder signal detected, network busy
3	Busy signal detected
4	No recognized signal detected (e.g., no signal, or nothing recognizable)
5	Voice detected * if this is a voice modem (e.g., V.253) operating in voice mode (e.g., +FCLASS=8.0)
7	Data Answering signal detected (e.g., V.25 ANS, V.8 ANSam)
8	Data Calling signal detected (e.g., V.25 CT, V.8 CI)
9	Fax Answering signal detected (e.g., T.30 CED, DIS)
A	Fax Calling signal detected (e.g., T.30 CNG)
B	V.8bis signal detected

Table 3-7. Multimedia Modes

Code	Definition
0	Data Only
1	Fax Only
2	Voice
9	Video-telephony, H.324
A	Other V.80 call

Table 3-8. DTE-DCE modes

Code	Definition
0	Async data
1	V.80 transparent synchronous mode
2	V.80 framed synchronous mode

Table 3-9. V.34 INFO bit report

Bits	Source bits	Definition
31-30	INFO0 bit 20; 0	
20-29	INFOc bits 79-88	
16-19	INFOc bits 26-29 or 35-38 or 44-47 or 53-56- or 62-65 or 71-74	Pre-emphasis field, selected by the symbol rate chosen
12-15	INFOa bits 26-29	
10-11	MP bit 50; 0	
0-9	INFOa bits 40-49	

Table 3-10. gstnModulationSchemeActive from 3.7.2/V.58

Value	Description
0	V.17 (G3 Fax call)
1	V.21
2	V.22
3	V.22bis
4	V.23 Constant Carrier (1200/75)
8	V.27ter (G3 Fax call)
9	V.29 HD (G3 Fax call)
A	V.32
B	V.32bis
C	V.34
E	V.90 and V.92
84	Bell 212A
85	Bell 103

Table 3-11. errorControl Active from 3.5.2/V.58

Value	Description
0	Disable/none
1	V.42 LAPM
2	V.42 Alternative protocol (MNP™)
80	MNP10™

Table 3-12. compressionActive from 3.2.2/V.58

Value	Description
0	None
1	V.42bis and V.44
80	MNP5™

Table 3-13. callCleared codes from 3.6.4/V.58-1994

Value	Description	Notes
0	CauseUnidentified	Call setup issues
1	No Previous call	Not in V.58
2	Call is still in progress	Not in V.58
3	Call Waiting signal detected	Not in V.58, only if modem can detect it
4	Delayed	Same as value 2A, CallAttemptsLimitExceeded
19	InactivityTimerExpired	
1F	cct108isOffInhibitsDial	DTR low
20	cct108turnedOff	DTR drop
29	BlacklistedNumber	
2A	CallAttemptsLimitExceeded	Same as “Delayed”, see ETS 300 001
2B	ExtensionPhoneOff-hook	If extension detection supported
2C	CallSetupFailTimerExpired	e.g., S7 timeout
2D	IncomingCallDetected	If incoming call while sending dial command.
2E	LoopCurrentInterrupted	
2F	NoDial tone	
31	ReorderTone	Fast busy
33	EngagedTone	Busy
34	LongSpaceDisconnect	And if modem program to abort on long space
3C	CarrierLost	Signal Converter
3D	TrainingFailed	
3E	NoModulationinCommon	
3F	RetrainFailed	
40	RetrainAttemptCountExceeded	
41	GstnCleardownReceived	
42	FaxDetected	If this was not a fax call attempt
46	InTestMode	Test
50	AnyKeyAbort	Call Control
51	DteHangupCommand	If ATH was used to terminate the previous call.
52	DteResetCommand	If ATZ was used to terminate the previous call.
5A	FrameReject	Error Control
5B	NoErrorControlEstablished	Error control was required
5C	ProtocolViolation	
5D	n400exceeded	LAPM retransmission Count Timer
5E	NegotiationFailed	
5F	DisconnectFrameReceived	
60	SabmeFrameReceived	
64	LossOfSynchronization	Data Compression

Example Modem Response and Usage

Example #UD commend response are shown in Table 3-14.

Table 3-14. Completed Data Call, with some errors and rate retrain during the call

Modem Response line	Description
DIAG <2A4D3263 0=09>	This is version 0.9
DIAG <2A4D3263 1=06 2=0 3=0>	Data Answer signal detected; Data only; Character async
DIAG <2A4D3263 5="C14513902A" 6="A145">	V.8 Call Menu indicates: V.8 Joint Menu selects:
DIAG <2A4D3263 10=1F 11=0C 12=52>	Receive level = -31 dBm; transmit level = -12 dBm; noise level = -82 dBm
DIAG <2A4D3263 14=03 15=05 16=10>	Far end echo delay in milliseconds; Far end echo loss in dB; Near end echo loss = 16 dB
DIAG <2A4D3263 20=C 22=780 24=0C80 26=79E0>	Transmitter: V.34 training completed; V.34 carrier frequency = 1920; V.34 symbol rate = 3200; initial transmit rate is 31200 bit/s
DIAG <2A4D3263 21=D 25=1F40 27=DAC0>	Receiver: V.90 training completed; V.90 symbol rate = 8000; initial receive rate is 56000 bit/s
DIAG <2A4D3263 30=00 31=03 32=01 33=01>	No carrier loss events, 3 carrier rate renegotiations attempted; 1 carrier retrain requested; 1 carrier retrain granted
DIAG <2A4D3263 34=7080 35=CB20>	Final transmit rate is 28800 bit/s; final receive rate is 52000 bit/s
DIAG <2A4D3263 40=1 41=100>	LAPM negotiation completed; frame size = 256
DIAG <2A4D3263 42=0 43=0>	No error control timeout or link NAKs
DIAG <2A4D3263 44=1 45=400>	V.42bis data compression used; dictionary size = 1024
DIAG <2A4D3263 50=2 51=2>	Hardware transmit and receive flow control
DIAG <2A4D3263 52=343CC 54=0>	213964 DTE characters transmitted, w/o underrun
DIAG <2A4D3263 53=7230E6 55=47>	7483622 DTE characters received, 71 characters lost due to receive data overrun
DIAG <2A4D3263 56=29D 58=0001>	597 (decimal) frames transmitted, with 1 frame error
DIAG <2A4D3263 58=2A4B 59=0004>	10827 (decimal) frames received, with 4 frame errors
DIAG <2A4D3263 60=51>	Local PC initiated hangup

%TT - PTT Test Command

This command facilitates PTT testing of signal levels by providing continuous signals regards of whether or not the modem is connected to the line. The signal transmitted is in accordance with the parameter provided.

A range of commands allows the user to initiate a series of signals required to obtain PTT approval. The signals emitted include answer tone, modulation, carriers, and other pertinent signals. A test is initiated upon receipt of a %TTn (the second T is a password and n is a test number), and the test is aborted when any keyboard character is entered. The modem will continuously transmit the tone or carrier according to the parameter supplied.

Syntax

%TT0x — x corresponds to the desired DTMF dial digit:

0	Dial digit 0
1	Dial digit 1
2	Dial digit 2
3	Dial digit 3
4	Dial digit 4
5	Dial digit 5
6	Dial digit 6
7	Dial digit 7
8	Dial digit 8
9	Dial digit 9
A	Dial digit *
B	Dial digit #
C	Dial digit A
D	Dial digit B
E	Dial digit C
F	Dial digit D

%TT3x — x corresponds to the selected MISC function:

0	Silence
1	2100 Hz
2	1300 Hz
3	1100 Hz
4	2225 Hz
5-F	Reserved

3.2.10 Compatibility Commands

&L - Leased Line Operation

This command requests leased line or dial-up operation. This command is provided for compatibility only; no mode change is performed, dial-up operation continues. The OK response is returned for a valid parameter, but no other action is performed. The parameter value, if valid, is written to S27 bit 2.

Syntax

&L<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Requests dial-up operation. Dial-up operation continues.

Result Codes

OK	0.
ERROR	Otherwise.

)M - Enable Cellular Power Level Adjustment

This command is included for compatibility only and has no effect other than returning a result code.

Syntax

)M<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	)M0 command.
	1	)M1 command.
	2	)M2 command.

Result Codes

OK	0 to 2.
ERROR	Otherwise.

@M - Initial Cellular Power Level Setting

This command is included for compatibility only and has no effect other than returning a result code.

Syntax

@M<value>

Defined Values

<value>	Decimal number corresponding to the selected power setting.	
	0	@M0 command.
	.	
	.	
	30	@M30 command.

Result Codes

OK	0 to 30.
ERROR	Otherwise.

:E - Compromise Equalizer Enable Command

This command is included for compatibility only and has no effect other than returning a result code.

Syntax

:E<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	:E0 command.
	1	:E1 command.

Result Codes

OK	0 or 1.
ERROR	Otherwise.

3.2.11 Fast Connect Commands

$F – Fast Connect Control

This command allows configuring of the client modem to connect to a central site modem that supports non-standard V.22, V.22 bis, and V.29 fast connect protocols. It is used in conjunction with S17.

Syntax

$F<n>

Defined Values

<n> Decimal number which specifies the initial requested mode of operation when the modem is operating as the originator. The options are:

0	Normal connection (Default)
1	Fast connect without answer tone
2	V.22 FastConnect
3	Fast connect with answer tone
4	V.29 FastPOS
6	V.29 FastPOS with alternate sequence

3.2.12 V.92 +P and –Q Commands

This section describes the +P (PCM DCE) and –Q commands and parameters used to control the V.92 Mode operation.

+PCW - Call Waiting Enable

This command controls the operation of the modem in the presence of call waiting.

Syntax

+PCW=<value>

Defined Values

<value> Decimal number corresponding to the selected operation.

0	Request modem-on-hold if enabled by +PMH and collect caller ID information if enabled by +VRID. Toggle V.24 circuit 125. (Default.)
1	Hang-up.
2	Ignore call waiting.

Result Codes

OK	<value> = 0, 1, or 2.
ERROR	Otherwise.

Reporting Selected Value(s)

Command: +PCW?

Response: +PCW: <value>

Example: +PCW: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PCW=?

Response: +PCW: (<value> range)

Example: +PCW: (0,1,2)

+PMH - Modem-on-Hold Enable

This command controls the selection of modem-on-hold in the modem. The action of the modem in response to modem-on-hold events is determined by the state of this command as well as the state of a negotiated handshake with a V.92-compliant server in V.92 Mode.

Syntax

+PMH=<value>

Defined Values

<value>	Decimal number corresponding to the selected operation.	
	0	Modem-on-hold enabled in V.92 Mode. (Default.)
	1	Disabled modem-on-hold.

Result Codes

OK	0 or 1 in V.92 Mode (see the +MS command)
ERROR	Otherwise.

Reporting Current or Selected Value

Command: +PMH?

Response: +PMH: <current value>

Example: +PMH: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PMH=?

Response: +PMH: (<value> range)

Example: +PMH: (0,1)

+PMHT – Modem-on-Hold Timer

This command controls whether or not the modem will grant or deny a modem-on-hold (MOH) request as well as setting the MOH Timeout value.

Syntax

+PMHT=<value>

Defined Values

<value> Decimal number corresponding to selected setting.

0	Deny V.92 modem-on-hold Request (Default.)
1	Grant MOH with 10 second timeout
2	Grant MOH with 20 second timeout
3	Grant MOH with 30 second timeout
4	Grant MOH with 40 second timeout
5	Grant MOH with 1 minute timeout
6	Grant MOH with 2 minute timeout
7	Grant MOH with 3 minute timeout
8	Grant MOH with 4 minute timeout
9	Grant MOH with 6 minute timeout
10	Grant MOH with 8 minute timeout
11	Grant MOH with 12 minute timeout
12	Grant MOH with 16 minute timeout
13	Grant MOH with indefinite timeout

Result Codes

OK	0-13 in V.92 Mode (+MS=V92)
ERROR	Otherwise

Reporting Current or Selected Values

Command: +PMHT?

Response: +PMHT: <value>

Example: +PMHT: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PMHT=?

Response: +PMHT: (<value> range)

Example: +PMHT: (0,1,2,3,4,5,6,7,8,9,10,11,12,13)

+PMHR - Initiate Modem-on-Hold

This command requests the modem to initiate or to confirm a modem-on-hold procedure. The modem will return ERROR if modem-on-hold is not enabled or if the modem is in an idle condition. The modem will return the string response +PMHR: <value> where <value> is a decimal value corresponding to the status of the modem's hold exchange procedure as defined below. This response may be delayed depending upon the context under which the +PMHR command is made, i.e., if the +PMHR is in response to an incoming modem-on-hold or if it is initiating a request.

Note: If modem-on-hold is enabled but the remote server does not support V.92 then the modem will always report 0 to show that the hold request is denied.

Syntax

+PMHR

Response

+PMHR:<value>

<value> Decimal number corresponding to the maximum hold time the server or hold-granting modem will allow.

0	V.92 MOH request denied or not available.
1	MOH with 10 second timeout Granted.
2	MOH with 20 second timeout Granted.
3	MOH with 30 second timeout Granted.
4	MOH with 40 second timeout Granted.
5	MOH with 1 minute timeout Granted.
6	MOH with 2 minute timeout Granted.
7	MOH with 3 minute timeout Granted.
8	MOH with 4 minute timeout Granted
9	MOH with 6 minute timeout Granted.
10	MOH with 8 minute timeout Granted.
11	MOH with 12 minute timeout Granted.
12	MOH with 16 minute timeout Granted.
13	MOH with indefinite timeout Granted.

Result Codes

OK	0-13 in V.92 Mode (+MS=V92)
ERROR	Otherwise

+PIG - PCM Upstream Ignore

This command controls the selection of PCM upstream in the modem. The actual state of PCM upstream is determined by the state of this command as well as the state of a negotiated handshake with a V.92-compliant server in V.92 Mode.

Syntax

+PIG=<value>

Defined Values

<value>	Decimal number corresponding to the selected operation.	
	0	Enable PCM upstream negotiation.
	1	Disable PCM upstream negotiation. (Default.)

Result Codes

OK	0 or 1 in V.92 Mode (+MS=V.92)
ERROR	Otherwise

Reporting Selected Value(s)

Command: +PIG?

Response: +PIG: <value>

Example: +PIG: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PIG=?

Response: +PIG: (<value> range)

Example: +PCW: (0,1)

+PMHF - V.92 Modem-on-Hold Hook Flash

This command causes the modem to initiate the flash hook sequence when in the modem-on-hold procedure. This enables switching to the second call (incoming or outgoing). This command applies only to V.92 modem-on-hold. There are no parameters associated with this command.

Syntax

+PMHF

Result Code

OK	When the modem completes the flash hook sequence.
ERROR	If this command is initiated and the modem is not on hold.

+PQC - V.92 Phase 1 and Phase 2 Control

This command controls the global enabling or disabling of the V.92 shortened Phase 1 and Phase 2 startup procedures. This command is used in conjunction with the +PSS command.

Syntax

+PQC=<value>

Defined Values

<value>	Decimal number corresponding to the selected setting.	
	0	Enable Short Phase 1, Short Phase 2, Short Phase 3, and Short Phase 4. (Default.)
	1	Not supported.
	2	Enable Short Phase 1 only.
	3	Disable all Short Phases.

Result Codes

OK	0, 2, or 3 in V.92 Mode (+MS=V.92)
ERROR	Otherwise

Reporting Selected Values

Command: +PQC?

Response: +PQC: <value>

Example: +PQC: 0

Reporting Supported Range of Parameter Values

Command: +PQC=?

Response: +PQC: (<value> range)

Example: +PQC: (0,1,3)

+PSS - Use Short Sequence

This command causes a calling modem to force either a V.92 short or full startup sequence as defined by the +PQC command on the next and subsequent connections.

Syntax

+PSS=<value>

Defined Values

<value> Decimal number corresponding to the selected sequence.

0	The modems decide whether or not to use the short startup procedures. The short startup procedures can only be used if enabled by the +PQC command. (Default.)
1	Reserved.
2	Forces the use of the full startup procedures on the next and subsequent connections independent of the setting of the +PQC command.

Result Codes

OK	0 - 2 in V.92 Mode (+MS=V.92)
ERROR	Otherwise

Reporting Selected Values

Command: +PSS?

Response: +PSS: <value>

Example: +PSS: 0 For the default <value>.

Reporting Supported Range of Parameter Values

Command: +PSS=?

Response: +PSS: (<value> range)

Example: +PSS: (0,1,2)

-QCPC - Force Full Startup Procedure Next Connection

This command causes the modem to use full startup procedures on the next connection attempt regardless of the setting of the +PQC command. After this attempt, the modem will select the startup procedure as defined by the +PQC command. If a shortened startup procedure is enabled by the +PQC command, then the quick connect profile will also be updated on the next connection attempt.

Syntax

-QCPC

Result Code

OK	In V.92 Mode (+MS=V.92)
ERROR	Otherwise

-QCPS - Enable Quick Connect Profile Save

This command controls whether or not the modem will save the generated quick connect profile.

Syntax

-QCPS=<value>

Defined Values

<value> Decimal number corresponding to the desired operation.

0	Do not allow the quick connect profile to be saved.
1	Allow the quick connect profile to be saved. (Default.)

Result Codes

OK	0 or 1 in V.92 Mode (+MS=V.92) and quick connect is enabled (+PSS = 0)
ERROR	Otherwise

Reporting Selected Value(s)

Command: -QCPS?

Response: -QCPS: <value>

Example: -QCPS: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: -QCPS=?

Response: -QCPS: (<value> range)

Example: -QCPS: (0,1)

3.3 S-Parameters

The S-Parameters are summarized in Table 3-15 along with their default values; registers denoted with an '*' may be stored in one of the two user profiles by entering the &W command. One of these profiles may be loaded at any time by using the Z command. Registers or register fields quoted as “reserved” are reserved for current or future use by the firmware, or are permanently overridden by PTT limitations. For the latter, control of the equivalent functionality is available with ConfigurACE Call Progress and Blacklisting options.

All bit-mapped registers are read-only. The appropriate AT command which controls the relevant bits in the S-Parameter should be used to change the value.

S - Read/Write S-Parameter

The modem selects an S-Parameter, performs an S-Parameter read or write function, or reports the value of an S-Parameter.

n	Establishes S-Parameter n as the last register accessed.
n=v	Sets S-Parameter n to the value v.
n?	Reports the value of S-Parameter n.

The parameter n can be omitted, in which case the last S-Parameter accessed will be assumed. The S can be omitted for AT= and AT?, in which case the last S-Parameter accessed will be assumed. For example:

ATS7 establishes S7 as the last accessed register.

AT=40 sets the contents of the last register accessed to 40.

ATS=20 sets the contents of the last register accessed to 20.

If the number "n" is outside the range of the S-Parameters available, the modem will return the ERROR message. If the value “v” is outside the range permitted for a given S-Parameter, the modem will return the ERROR message. Input and output are always in decimal format. Note that some S-Parameters are read-only.

In some cases, writing to the S-Parameter will appear to be accepted but the value will not actually be written.

Due to country restrictions, some commands will be accepted, but the value may be limited and replaced by a maximum or minimum value.

Minimum, maximum, and default values for S-Parameters may be altered with ConfigurACE.

3.3.1 Factory Defaults

The factory default values are stored in ROM and are loaded into the active configuration at power up or by the ATZ command. In addition, the designated default profile is subsequently loaded, and may change some of the factory default values. The designated default profile can be changed by entering the &Y command where n is one of the two possible user profiles.

The defaults shown are those used by Conexant in factory profiles zero and one. These may be overwritten by the OEM with ConfigurACE prior to placing the firmware in PROM. Minimum and maximum values may also be imposed by ConfigurACE in response to country PTT requirements.

The default values shown in Table 3-15 may vary by modem firmware configuration. Consult the MCU firmware release notes for exact configuration.

The factory default values may be loaded at any time by entering the &Fn command.

Table 3-15. S-Parameter Summary

Register	Function	Range	Units	Saved	Default**
S0	Rings to Auto-Answer	0-255	rings	*	0
S1	Ring Counter	0-255	rings		0
S2	Escape Character	0-255	ASCII	*	43
S3	Carriage Return Character	0-127	ASCII		13
S4	Line Feed Character	0-127	ASCII		10
S5	Backspace Character	0-255	ASCII		8
S6	Wait Time before Blind Dialing or for Dial Tone	2-255	s	*	2
S7	Wait Time for Carrier, Silence, or Dial Tone	1-255	s	*	50
S8	Pause Time for Dial Delay Modifier	2-255	s	*	2
S9	Carrier Detect Response Time	1-255	0.1 s	*	6
S10	Lost Carrier To Hang Up Delay	1-255	0.1 s	*	14
S11	DTMF Tone Duration	50-255	0.001 s	*	95
S12	Escape Prompt Delay (EPD)	0-255	0.02 s	*	50
S14	General Bit Mapped Options Status	-	-		138 (8Ah)
S16	Test Mode Bit Mapped Options Status	-	-		0
S17	Point of Sale Options Selection	-	-		0
S19	Reserved	-	-		0
S20	Reserved	-	-		0
S21	V.24/General Bit Mapped Options Status	-	-		52 (34h)
S22	Speaker/Results Bit Mapped Options Status	-	-		117 (75h)
S23	General Bit Mapped Options Status		-		0
S24	Sleep Inactivity Timer	0-255	s		0
S25	Delay to DTR Off	0-255	s or 0.01 s		5
S26	RTS-to-CTS Delay	0-255	0.01 s		1
S27	General Bit Mapped Options Status	-	-		73 (49h)
S28	General Bit-Mapped Options Status	-	-		0
S29	Flash Dial Modifier Time	0-255	10 ms		70
S30	Disconnect Inactivity Timer	0-255	10 s		0
S31	General Bit-Mapped Options Status	-	-		192 (C0h)
S36	LAPM Failure Control	-	-	*	7
S38	Delay Before Forced Hangup	0-255	s		20
S39	Flow Control Bit Mapped Options Status	-	-		3
S40	General Bit-Mapped Options Status	-	-	*	104 (68h)
S41	General Bit-Mapped Options Status	-	-	*	195 (C3h)
S46	Data Compression Control	-	-	*	138
S48	V.42 Negotiation Control	-	-		7
S86	Call Failure Indication	0-26	-		21
S91	PSTN Transmit Attenuation Level	0-15	dBm		10 (Country dependent)
S92	Fax Transmit Attenuation Level	0-15	dBm		10 (Country dependent)
S95	Extended Result Codes Control	-	-	*	0
S210	V.34 Symbol Rate	0-255	-		13 (0Dh)

* Register value may be stored in one of two user profiles with the &W command.

** Default values may be modified using ConfigurACE.

3.3.2 S-Parameter Definitions

S0 - Number of Rings to Auto-Answer

S0 sets the number of the rings required before the modem automatically answers a call. Setting this parameter to zero disables auto-answer mode.

Range: 0-255 rings

Default: 0

S1 - Ring Counter

S1 is incremented each time the modem detects a ring signal on the telephone line. S1 is cleared if no rings occur over an eight second interval.

Range: 0-255 rings

Default: 0

S2 - Escape Character

S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII '+'. A value over 127 disables the escape process, i.e., no escape character will be recognized.

Range: 0-255, ASCII decimal

Default: 43 (+)

S3 - Carriage Return Character

S3 sets the command line and result code terminator character. Pertains to asynchronous operation only.

Range: 0-127, ASCII decimal

Default: 13 (Carriage Return)

S4 - Line Feed Character

S4 sets the character recognized as a line feed. Pertains to asynchronous operation only. The Line Feed control character is output after the Carriage Return control character if verbose result codes are used.

Range: 0-127, ASCII decimal

Default: 10 (Line Feed)

S5 - Backspace Character

S5 sets the character recognized as a backspace. Pertains to asynchronous operation only. The modem will not recognize the Backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the Backspace character, an ASCII space character and a second Backspace character; this means a total of three characters are transmitted each time the modem processes the Backspace character.

Range: 0-32, ASCII decimal

Default: 8 (Backspace)

S6 - Wait Time before Blind Dialing or for Dial Tone

S6 operation is country dependent.

1. Sets the length of time, in seconds, that the modem will wait before starting to dial after going off-hook when blind dialing. This operation, however, may be affected by some ATX options according to country restrictions. The "Wait for Dial Tone" call progress feature (W dial modifier in the dial string) will override the value in register S6. (US models.)
2. Sets the length of time, in seconds, that the modem will wait for dial tone when encountering a "W" dial modifier before returning NO DIAL TONE result code. (W class.)

The modem always pauses for a minimum of 2 seconds, even if the value of S6 is less than 2 seconds.

Range: 2-255 seconds

Default: 2

S7 - Wait Time for Carrier, Silence, or Dial Tone

S7 operation is country dependent.

1. Sets the length of time, in seconds, that the modem will wait for carrier before hanging up. The timer is started when the modem finishes dialing (originate), or 2 seconds after going off-hook (answer). In originate mode, the timer is reset upon detection of answer tone if allowed by country restrictions.
2. Sets the length of time, in seconds, that modem will wait for silence when encountering the @ dial modifier before continuing with the next dial string parameter.
3. Sets the length of time, in seconds, that the modem will wait for dial tone when encountering a "W" dial modifier before continuing with the next dial string parameter. (US models.)

Range: 1-255 seconds

Default: 50

S8 - Pause Time For Dial Delay

S8 sets the time, in seconds, that the modem must pause when the "," dial modifier is encountered in the dial string.

Range: 2-255 seconds

Default: 2

S9 - Carrier Detect Response Time

S9 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: 6 tenths of a second

Default: 6 (0.6 second)

S10 - Lost Carrier To Hang Up Delay

S10 sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. When register S10 is set to 255, the modem functions as if a carrier is always present.

The actual interval the modem waits before disconnecting is the value in register S10 minus the value in register S9. Therefore, the S10 value must be greater than the S9 value or else the modem disconnects before it recognizes the carrier.

Range: 1-255 tenths of a second

Default: 14 (1.4 seconds)

Note: For Call Waiting detection, if the modem is set to US country code and S10 >=16, then the modem will detect the Call Waiting tone and hang-up the line. If S10 <16, the modem will not detect Call Waiting tone.

S11 - DTMF Tone Duration

S11 operation is country dependent.

1. For US models, S11 sets the duration of tones in DTMF dialing (has no effect on pulse dialing).
2. For W-class models, S11 is a country parameter loaded by ConfigurACE.

Range: 50-255 milliseconds

Default: 95 (95 milliseconds)

S12 - Escape Prompt Delay (EPD)

S12 defines the maximum period, in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent. Sending of the OK result code does not affect entry into command mode. (See 3.1.3.)

Range: 0-255 1/50 of a second

Default: 50 (1 second)

S14 - General Bit Mapped Options Status

S14 indicates the status of command options.

Default: 138 (8Ah) (10001010b)

Bit 0 This bit is ignored.

Bit 1 Command echo (En)

- 0 = Disabled (E0)
- 1 = Enabled (E1) (Default.)

Bit 2 Quiet mode (Qn)

- 0 = Send result codes (Q0) (Default.)
- 1 = Do not send result codes (Q1)

Bit 3 Result codes (Vn)

- 0 = Numeric (V0)
- 1 = Verbose (V1) (Default.)

Bit 4 Reserved

Bit 5 Tone (T)/Pulse (P)

- 0 = Tone (T) (Default.)
- 1 = Pulse (P)

Bit 6 Reserved

Bit 7 Originate/Answer

- 0 = Answer
- 1 = Originate (Default.)

S16 - Test Mode Bit Mapped Options Status

S16 indicates the test in progress status.

Default: 0

Bit 0 Local analog loopback

- 0 = Disabled (Default.)
- 1 = Enabled (&T1)

Bits 1-7 Not used

S17 - Point Of Sale Options Selection

S17 selects the different options available for Point of Sale applications.

Default: 0 (00000000b)

Bit 0 V.80 sub-mode selection (applicable only if V.80 Synchronous Access Mode is enabled; see +ES command)

- 0 = Enable transparent sub-mode. (Default)
- 1 = Enable framed sub-mode.
- Note: When V.80 is enabled in V.22 fast connect ($F2) or V.29FastPOS ($F4), the modem automatically connects in framed sub-mode even if bit1 = 0.

Bit 1 V.22bis/V.22/Bell 212 early data mode selection

- 0 = Enable normal V.22bis/V.22/Bell212 handshake. (Default)
- 1 = Enable early data mode (CTS turned ON sooner) for V.22bis/V.22/Bell 212.

Bit 2 Logical/physical hang-up selection (applicable only if V.80 Synchronous Access Mode is enabled; see +ES command)

- 0 = Enable logical hang-up if remote had already dropped its carrier when ATH command is issued to the modem. Otherwise, the modem waits for S38 delay before it physically disconnects. (Default)
- 1 = Enable physical hang-up if remote side had already dropped its carrier when ATH command is issued to the modem. Otherwise, the modem does not wait for S38 delay but hangs up immediately.

Bit 3 Enable/Disable HDLC in V.22 fast connect (applicable only in V.22 fast connect mode ($F2 is selected), and &Q0, &Q5, or &Q6 is selected)

- 0 = Enable asynchronous mode. (Default)
- 1 = Enable HDLC (synchronous mode).
- Note: If V.80 Synchronous Access Mode is enabled, the modem will automatically connect in V22 fast connect synchronous mode even if bit 3 = 0.

Bit 3 V.22 fast connect synchronous mode handshake selection (applicable only for CX81300 SmartACF and CX06827 SCXXD in hardware synchronous mode, i.e., &Q1, &Q2, or &Q3 is selected)

- 0 = Select standard handshake (scrambled ones are sent during handshake). (Default)
- 1 = Select SDLC handshake (scrambled flags are sent during handshake).
- Note: If V.80 Synchronous Access Mode is enabled, the modem will automatically connect in V22 fast connect synchronous mode even if bit 3 = 0.

Bit 4 V.29 FastPOS mode selection

- 0 = Enable V.29 FastPOS. (Default)
- 1 = Enable V.29 FastPOS alternate sequence.

Bit 5 V.29 FastPOS fallback selection

- 0 = Enable V.29 FastPOS with fallback to standard V.22 bis. (Default)
- 1 = Enable V.29 FastPOS with fallback to V.22 fast connect.

Bit 6 Fast Bell 103/V.21 (applicable only if Bell 103, V.21, or V.23 half-duplex (HDX) is enabled; see +MS and B2 commands)

- 0 = Enable standard Bell 103/V.21/V.23HDX (Default)
- 1 = Enable fast Bell 103/V.21 or non-standard V.23HDX 21

Bit 7 Not used (Reserved)

S19 - Reserved

S19 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: None

Default: 0

S20 - Reserved

S20 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: None

Default: 0

S21 - V.24/General Bit Mapped Options Status

S21 indicates the status of command options.

Default: 52 (34h) (00110100b)

Bits 0 - 1 Reserved (0)

Bit 2 CTS behavior (&Rn)

- 0 = CTS tracks RTS (&R0)
- 1 = CTS always on (&R1) (Default.)

Bits 3-4 DTR behavior (&Dn)

- 0 = &D0 selected
- 1 = &D1 selected
- 2 = &D2 selected (Default.)
- 3 = &D3 selected

Bit 5 RLSD (DCD) behavior (&Cn)

- 0 = &C0 selected
- 1 = &C1 selected (Default.)

Bit 6 DSR behavior (&Sn)

- 0 = &S0 selected (Default.)
- 1 = &S1 selected

Bit 7 Long space disconnect (Yn)

- 0 = Y0 (Default.)
- 1 = Y1

S22 - Speaker/Results Bit Mapped Options Status

S22 indicates the status of command options.

Default: 117 (75h) (01110101b)

Bits 0-1 Speaker volume (Ln)

- 0 = Off (L0)
- 1 = Low (L1) (Default.)
- 2 = Medium (L2)
- 3 = High (L3)

Bits 2-3 Speaker control (Mn)

- 0 = Disabled (M0)
- 1 = Off on carrier (M1) (Default.)
- 2 = Always on (M2)
- 3 = On during handshake (M3)

Bits 4-6 Limit result codes (Xn)

- 0 = X0
- 4 = X1
- 5 = X2
- 6 = X3
- 7 = X4 (Default.)

Bit 7 Reserved

S23 - General Bit Mapped Options Status

S23 indicates the status of command options.

Default: 0

Bits 0-6 Not used

Bits 6-7 Guard tone (&Gn)

0 = None (&G0) (Default.)
1 = None (&G1)
2 = 1800 Hz (&G2)

S24 - Sleep Inactivity Timer

S24 sets the length of time, in seconds, that the modem will operate in normal mode with no detected telephone line or DTE line activity before entering low-power sleep mode. The timer is reset upon any DTE line or telephone line activity. If the S24 value is zero, neither DTE line nor telephone inactivity will cause the modem to enter the sleep mode.

Range: 0-255 seconds

Default: 0

S25 - Delay To DTR Off

S25 sets the length of time that the modem will ignore DTR for taking the action specified by &Dn. Its units are seconds for synchronous modes and one hundredths of a second for other modes.

Range: 0-255 (1 second for synchronous modes 1; 0.01 second otherwise)

Default: 5

S26 - RTS to CTS Delay

S26 sets the time delay, in hundredths of a second, before the modem turns CTS ON after detecting an OFF-to-ON transition on RTS when &R0 is commanded. Pertains to synchronous operation only.

Range: 0-255 hundredths of a second

Default: 1

S27 - Bit Mapped Options Status

S27 indicates the status of command options.

Default: 73 (49h) (01001001b)

Bits 0,1,3 Synchronous/asynchronous selection (&Mn/&Qn)

3	**1**	**0**		
0	0	0	=	&M0 or &Q0
0	0	1	=	&M1 or &Q1
0	1	0	=	&M2 or &Q2
0	1	1	=	&M3 or &Q3
1	0	0	=	Reserved
1	0	1	=	&Q5 (Default.)
1	1	0	=	&Q6

Bit 2 Leased line control (&Ln)

0 = Dial up line (&L0) (Default.)

Bits 4 - 5 Internal clock select (&Xn)

0 = Internal clock (&X0) (Default.)

1 = External clock (&X1)

2 = Slave clock (&X2)

Bit 6 CCITT/Bell mode select (Bn)

0 = CCITT mode (B0)

1 = Bell mode (B1) (Default.)

Bit 7 - Reserved

S28 - Bit Mapped Options Status

S28 indicates bit mapped options status.

Default: 0

Bits 0 - 1 Reserved

Bit 2 Reserved (always 0).

Bits 3 - 4 Pulse dialing (&Pn)

0 = 39%-61% make/break ratio at 10 pulses per second (&P0) (Default.)

1 = 33%-67% make/break ratio at 10 pulses per second (&P1)

2 = 39%-61% make/break ratio at 20 pulses per second (&P2)

3 = 33%-67% make/break ratio at 20 pulses per second (&P3)

Bit 5-7 Reserved

S29 - Flash Dial Modifier Time

S29 sets the length of time, in units of 10 ms, that the modem will go on-hook when it encounters the flash (!) dial modifier in the dial string. S29 is a country dependent parameter. The S29 value cannot be changed using S29=XX.

Range: 0-255 10 ms intervals

Default: 70 (700 ms) for U.S.

S30 - Disconnect Inactivity Timer

S30 sets the length of time, in tens of seconds, that the modem will stay online before disconnecting when no data is sent or received. In error-correction mode, any data transmitted or received will reset the timer. In other modes, any data transmitted will reset the timer. The timer is inoperative in synchronous mode.

Range: 0-255 tens of seconds (0-2550 seconds)

Default: 0 (disabled)

S31 - Bit Mapped Options Status

S31 indicates bit mapped options status.

Default: 192 (C0h) (11000000b)

Bit 0 Single line connect message enable/disable (\Vn)
- 0 = Messages controlled by S95, Wn and Vn (\V0) (Default.)
- 1 = Single line connect message (\V1)

Bit 1 Reserved (0)

Bits 2-3 Error correction progress messages (Wn)
- 0 = DTE speed only (W0) (Default.)
- 1 = Full reporting (W1)
- 2 = DCE (line) speed only (W2)

Bits 4-5 Caller ID (+VCID)
- 0 = Caller ID disabled (+VCID=0) (Default.)
- 1 = Short (formatted) Caller ID enabled (+VCID=1)
- 2 = Long (unformatted) Caller ID enabled (+VCID=2)

Bits 6-7 Reserved (Default = 11b)

S36 - LAPM Failure Control

Default: 7 (00000111b)

Bits 0-2 This value indicates what should happen upon a LAPM failure. These fallback options are initiated immediately upon connection if S48=128. If an invalid number is entered, the number is accepted into the register, but S36 will act as if the default value has been entered.

- 0 = Modem disconnects.
- 1 = Modem stays on-line and a Direct mode connection is established.
- 2 = Reserved.
- 3 = Modem stays on-line and a Normal mode connection is established.
- 4 = An MNP connection is attempted and if it fails, the modem disconnects.
- 5 = An MNP connection is attempted and if it fails, a Direct mode connection is established.
- 6 = Reserved.
- 7 = An MNP connection is attempted and if it fails, a Normal mode connection is established. (Default.)

Bits 3-7 Reserved

S38 - Delay Before Forced Hang Up

S38 specifies the delay between the modem's receipt of the H command to disconnect (or ON-to-OFF transition of DTR if the modem is programmed to follow the signal), and the disconnect operation. Applicable to error-correction connection only. This parameter can be used to ensure that data in the modem buffer is sent before the modem disconnects.

1. If S38 is set to a value between 0 and 254, the modem will wait that number of seconds for the remote modem to acknowledge all data in the modem buffer before disconnecting. If time expires before all data is sent, the NO CARRIER result code will be issued to indicate that data has been lost. If all data is transmitted prior to time-out, the response to the H0 command will be OK.

2. If S38 is set to 255, the modem does not time-out and continues to attempt to deliver data in the buffer until the connection is lost or the data is delivered.

Range: 0-255 seconds

Default: 20

S39 - Flow Control Bit Mapped Options Status

Default: 3 (00000011b)

Bits 0-2 Status of command options

0 =	No flow control
3 =	RTS/CTS (&K3) (Default.)
4 =	XON/XOFF (&K4)
5 =	Transparent XON (&K5)
6 =	Both methods (&K6)

Bits 3-7 Reserved

S40 - General Bit Mapped Options Status

S40 indicates the status of command options.

Default: 104 (68h) (01101000b)

Bits 0-1 MNP Extended Services (-Kn)

0 =	Disable extended services (-K0) (Default.)
1 =	Enable extended services (-K1)
2 =	Enable extended services (-K2)

Bit 2 Reserved

Bits 3-5 Break Handling (\Kn)

0 =	\K0
1 =	\K1
2 =	\K2
3 =	\K3
4 =	\K4
5 =	\K5 (Default.)

Bits 6-7 Reserved

S41 - General Bit Mapped Options Status

S41 indicates the status of command options.

Default: 13 (C3h) (00001101b)

Bits 0 -1 Compression selection (%Cn)

0 =	Disabled (%C0)
1 =	MNP 5 (%C1)
2 =	V.42 bis (%C2)
3 =	MNP 5 and V.42 bis (%C3) (Default.)

Bits 2, 6 Auto retrain and fallback/fall forward (%En)

Bit 6	Bit 2		
0	0	=	Retrain and fallback/fall forward disabled (%E0)
0	1	=	Retrain enabled (%E1)
1	0	=	Fallback/fall forward enabled (%E2) (Default.)

Bit 3 Reserved

Bits 4-5 Reserved

Bit 7 Reserved

S46 - Data Compression Control

S46 controls selection of compression. The following actions are executed for the given values:

Range: 136 or 138

Default: 138

S46=136 Execute error correction protocol with no compression.

S46=138 Execute error correction protocol with compression. (Default.)

S48 - V.42 Negotiation Control

The V.42 negotiation process determines the capabilities of the remote modem. However, when the capabilities of the remote modem are known and negotiation is unnecessary, this process can be bypassed if so desired.

Range: 0, 7, or 128 If an invalid number is entered, it is accepted into the S-Parameter, but S48 will act as if 128 has been entered.

Default: 7

S48=0 Disable negotiation; bypass the detection and negotiation phases; and proceed with LAPM.

S48=7 Enable negotiation. (Default.)

S48=128 Disable negotiation; bypass the detection and negotiation phases; and proceed at once with the fallback action specified in S36. Can be used to force MNP.

S86 - Call Failure Reason Code

When the modem issues a NO CARRIER result code, a value is written to S86 Register to help determine the reason for the failed connection. S86 records the first event that contributes to a NO CARRIER message. The code definitions are:

Range: 0-26

Default: 21

S86=0 Normal hangup, no error occurred.

S86=1 Reserved.

S86=2 Reserved.

S86=3 Call Waiting caused disconnect.

S86=4 Physical carrier loss.

S86=5 No error correction at the other end.

S86=6 No response to feature negotiation.

S86=7 This modem is async only; the other modem is sync only.

S86=8 No framing technique in common.

S86=9 No protocol in common.

S86=10 Bad response to feature negotiation.

S86=11 No sync information from the remote modem.

S86=12 Normal hangup initiated by the remote modem.

S86=13 Retransmission limit reached.

S86=14 Protocol violation occurred.

S86=15 Lost DTR.

S86=16 Received GSTN cleardown.

S86=17 Inactivity timeout.

S86=18 Speed not supported.

S86=19 Long space disconnect.

S86=20 Key abort disconnect.

S86=21 Clears previous disconnect reason.

S86=22 No connection established.

S86=23 Disconnect after three retrains.

S86=24 Call Waiting tone detected.

S86=25 Extension pickup detected.

S86=26 Remote hangup detected.

S91 - PSTN Transmit Attenuation Level

In non-PCM modes (V.90 and V.92 are PCM modes), S91 sets the transmit attenuation level from 0 to 15 dBm for the PSTN mode, resulting in a transmit level from 0 to -15 dBm. In some countries, the transmit level may not be changed and there are checks to prevent transmit attenuation level change using ConfigurACE.

Range: 0 to 15 dBm (Corresponding to 0 to -15 dBm transmit level.)

Default: 10 (-10 dBm transmit level.)

S92 - Fax Transmit Attenuation Level

S92 sets the transmit attenuation level from 0 to 15 dBm for the fax mode, resulting in a transmit level from 0 to -15 dBm. In some countries, the transmit level may not be changed and there are checks to prevent transmit attenuation level change using ConfigurACE.

Range: 0 to 15 dBm (Corresponding to 0 to -15 dBm transmit level.)

Default: 10 (-10 dBm transmit level.)

S95 - Extended Result Codes Control

A bit set to a 1 in this parameter, in conjunction with the W command, will enable the corresponding extended result code (see Section 3.4 and Table 3-16).

The +MR, +ER, and +DR settings also control S95 bits 2, 3, and 5, respectively. The more recent settings of +MR, +ER, and +DR, or host writing of S95 bits 2, 3, and 5, along with the W command setting, determine the corresponding actual result code reporting (see +MR, +ER, DR, and W commands).

Default: 0

Bit 0	CONNECT result code indicates DCE speed instead of DTE speed.
Bit 1	Append/ARQ to CONNECT XXXX result code in error-correction mode (XXXX = rate).
Bit 2	Enable +MCR: XXXX result code (XXXX = modulation) and +MRR: XXXX result code (XXXX = rate). (Also, see +MR.)
Bit 3	Enable +ER: XXXX result code (XXXX = protocol identifier).
Bit 4	Reserved.
Bit 5	Enable +DR: XXXX result code (XXXX = compression type).
Bits 6-7	Reserved.

S210 – V.34 Symbol Rates

The bits in this parameter control V.34 symbols rates and enables/disables V.34 asymmetric rates. This parameter is used for diagnostic purpose only.

Default: 13 (0Dh) (00001101b)

Bits 0-2 Selects the range of allowed V.34 symbol rates.

2 1	**0**		**Symbol Rates (baud)**
0 0	0	=	2400 only
0 0	1	=	2400 only (no 2734)
0 1	0	=	2400, 2800
0 1	1	=	2400, 2800, 3000
1 0	0	=	2400, 2800, 3000, 3200
1 0	1	=	2400, 2800, 3000, 3200, 3429 (Default.)

Bit 3 Enable/disable V.34 asymmetric rates.

0 =	Disable asymmetric rates
1 =	Enable asymmetric rates (Default.)

Bits 4-7 Reserved.

Examples

S210=13 Enable asymmetric rates with all symbol rates available (Default.).

S210=5 Disable asymmetric rates with all symbol rates available.

S210=8 Enable asymmetric rates with only 2400 baud available.

S210=11 Enable asymmetric rates with 2400 to 3000 baud available.

3.4 Result Codes

The modem responds to commands from the DTE and to activity on the line by signaling to the DTE in the form of result codes. The result codes that the modem can send are described in Table 3-16.

Two forms of each result code are available: long-form, an English-like "verbose" response, and short-form, a data-like numeric response (included in parentheses following the long-form). The long-form code is preceded and terminated by the sequence < CR> < LF>. The short-form is terminated by < CR>, only with no preceding sequence.

If result messages are suppressed, nothing is returned to the DTE. The long-form results codes can be modified by the OEM through the .INF file.

Table 3-16. Result Code Definitions

Code	Message	Meaning
+F4	+FCERROR	High speed fax data (V.27, V.29, V.33, or V.17) is expected but a V.21 signal is received.
0	OK	A command line has been executed.
1	CONNECT	For X command values specifying no speed reporting, the modem has connected to the line and either the line speed is 300 bps and line speed is enabled, or the DTE speed is 300 bps and DTE speed reporting is enabled.
2	RING	An incoming ring signal is detected on the line. What qualifies as a ring signal is determined by country-dependent parameters, modifiable through ConfigurACE. When cellular interface is selected, RING indicates that the cellular phone is receiving an receiving an incoming call.
3	NO CARRIER	Sent when attempting to establish a call if: 1. Ringback is detected and later ceases but no carrier is detected within the period of time determined by register S7, or 2. No ringback is detected within the period of time determined by register S7. Also sent when the modem auto-disconnects due to loss of carrier. For X0, sent for the following conditions: 1. If busy tone detection is enforced, busy or circuit busy has been detected. 2. If dial tone detection is enforced or selected, dial tone has not been detected.
4	ERROR	Sent during an attempt to execute a command line if any of the following conditions occur: 1. The command line contains a syntax error. 2. The modem cannot execute a command contained in the command line, i.e., the command does not exist or is not supported. 3. A command parameter within the command line is outside the permitted range. For X0, X1, X2, and X3, this message is sent instead of DELAYED and BLACKLISTED.
5	CONNECT 1200	The modem has connected to the line and either the line speed is 1200 bps and DCE speed reporting is enabled, or the DTE speed is 1200 bps and DTE speed reporting is enabled.
6	NO DIAL TONE	For X2 and X4, the modem has been instructed to wait for dial tone during dialing but none is received. When cellular phone interface is selected, indicates that cellular service is not currently available.
7	BUSY	For X3 and X4, if busy tone detection is enforced, the busy (engaged) signal is detected on the line when the modem is attempting to originate a call.
8	NO ANSWER	The modem is attempting to originate a call if a continuous ringback signal is detected on the line until the expiration of the timer S7.
9	CONNECT 600	The modem has connected to the line, the DTE speed is 600 bps, and DTE speed reporting is enabled.
10	CONNECT 2400	The modem has connected to the line and either the line speed is 2400 bps and DCE speed reporting is enabled, or the DTE speed is 2400 bps and DTE speed reporting is enabled.
11	CONNECT 4800	The modem has connected to the line and either the line speed is 4800 bps and DCE speed reporting is enabled, or the DTE speed is 4800 bps and DTE speed reporting is enabled.
12	CONNECT 9600	The modem has connected to the line and either the line speed is 9600 bps and DCE speed reporting is enabled, or the DTE speed is 9600 bps and DTE speed reporting is enabled.
13	CONNECT 7200	The modem has connected to the line at 7200 bps and DCE speed reporting is enabled.
14	CONNECT 12000	The modem has connected to the line at 12000 bps and DCE speed reporting is enabled.
15	CONNECT 14400	The modem has connected to the line at 14400 bps and DCE speed reporting is enabled.
16	CONNECT 19200	The modem has connected to the line and either the line speed is 19200 bps and DCE speed reporting is enabled, or the DTE speed is 19200 bps and DTE speed reporting is enabled.
17	CONNECT 38400	The modem has connected to the line, the DTE speed is 38400 bps, and DTE speed reporting is enabled.
18	CONNECT 57600	The modem has connected to the line, the DTE speed is 57600 bps, and DTE speed reporting is enabled.
19	CONNECT 115200	The modem has connected to the line, the DTE speed is 115200 bps, and DTE speed reporting is enabled.
22	CONNECT 75TX/1200RX	The modem has established a V.23 originate connection and line speed reporting is enabled.
23	CONNECT 1200TX/75RX	The modem has established a V.23 answer connection and line speed reporting is enabled.

Code	Message	Meaning
24	DELAYED	For X4, sent when a call fails to connect and the number dialed is considered 'delayed' due to country blacklisting requirements.
32	BLACKLISTED	For X4, sent when a call fails to connect and the number dialed is considered 'blacklisted'.
33	FAX	A fax modem connection is established in a facsimile mode.
35	DATA	A data modem connection is established in a facsimile mode.
40	+MRR: 300	The modem has connected to the line at 300 bps and carrier reporting is enabled. (See S95 and Xn.)
44	+MRR: 1200/75	The V.23 backward channel carrier is detected and carrier reporting is enabled. (See S95 and Xn.)
45	+MRR: 75/1200	The V.23 forward channel carrier is detected and carrier reporting is enabled. (See S95 and Xn.)
46	+MRR: 1200	The modem has connected to the line at 1200 bps and carrier reporting is enabled. (See S95 and Xn.)
47	+MRR: 2400	The modem has connected to the line at 2400 bps and carrier reporting is enabled. (See S95 and Xn.)
48	+MRR: 4800	The modem has connected to the line at 4800 bps and carrier reporting is enabled. (See S95 and Xn.)
49	+MRR: 7200	The modem has connected to the line at 7200 bps and carrier reporting is enabled. (See S95 and Xn.)
50	+MRR: 9600	The modem has connected to the line at 9600 bps and carrier reporting is enabled. (See S95 and Xn.)
51	+MRR: 12000	The modem has connected to the line at 12000 bps and carrier reporting is enabled. (See S95 and Xn.)
52	+MRR: 14400	The modem has connected to the line at 14400 bps and carrier reporting is enabled. (See S95 and Xn.)
53	+MRR: 16800	The modem has connected to the line at 16800 bps and carrier reporting is enabled. (See S95 and Xn.)
54	+MRR: 19200	The modem has connected to the line at 19200 bps and carrier reporting is enabled. (See S95 and Xn.)
55	+MRR: 21600	The modem has connected to the line at 21600 bps and carrier reporting is enabled. (See S95 and Xn.)
56	+MRR: 24000	The modem has connected to the line at 24000 bps and carrier reporting is enabled. (See S95 and Xn.)
57	+MRR: 26400	The modem has connected to the line at 26400 bps and carrier reporting is enabled. (See S95 and Xn.)
58	+MRR: 28800	The modem has connected to the line at 28800 bps and carrier reporting is enabled. (See S95 and Xn.)
59	CONNECT 16800	The modem has connected to the line, the DTE speed is 16800 bps and DTE speed reporting is enabled.
61	CONNECT 21600	The modem has connected to the line, the DTE speed is 21600 bps and DTE speed reporting is enabled.
62	CONNECT 24000	The modem has connected to the line, the DTE speed is 24000 bps and DTE speed reporting is enabled.
63	CONNECT 26400	The modem has connected to the line, the DTE speed is 26400 bps and DTE speed reporting is enabled.
64	CONNECT 28800	The modem has connected to the line and either the line speed is 28800 bps and DCE speed reporting is enabled, or the DTE speed is 28800 bps and DTE speed reporting is enabled.
66	+DR: ALT	The modem has connected to the line in MNP Class 5 and +DR: message reporting is enabled. (See S95, Wn, and Xn.)
67	+DR: V.42B	The modem has connected to the line in V.42 bis and +DR: message reporting is enabled. (See S95, Wn, and Xn.)
69	+DR: NONE	The modem has connected to the line without data compression and +DR: message reporting is enabled. (See S95, Wn, and Xn.)
70	+ER: NONE	The modem has connected to the line without any form of error correction and the +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
77	+ER: LAPM	The modem has connected to the line in V.42 LAPM error correction mode and +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
78	+MRR: 31200	The modem has connected to the line at 31200 bps and carrier reporting is enabled. (See S95 and Xn.)
79	+MRR: 33600	The modem has connected to the line at 33600 bps and carrier reporting is enabled. (See S95

Code	Message	Meaning
		and Xn.)
80	+ER: ALT	Sent when the modem has connected in the MNP mode of error correction, and +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
81	+ER: ALT-CELLULAR	The modem has connected in the MNP 10 mode and cellular power level adjustment is enabled (")M1 or)M2").(See S95, Wn, and Xn.)
83	LINE IN USE	The modem attempted to go off-hook when an extension was already occupying the line.
84	CONNECT 33600	The modem has connected to the line, the DTE speed is 33600 bps and the DTE speed reporting is enabled.
91	CONNECT 31200	The modem has connected to the line DTE speed is 31200 bps and the modem is to report the DTE speed upon connecting.
134	+MCR: B103	The modem has connected to the line with Bell 103 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
135	+MCR: B212	The modem has connected to the line with Bell 212 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
136	+MCR: V21	The modem has connected to the line with ITU-T V.21 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
137	+MCR: V22	The modem has connected to the line with ITU-T V.22 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
138	+MCR: V22B	The modem has connected to the line with ITU-T V.22 bis modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
139	+MCR: V23	The modem has connected to the line with ITU-T V.23 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
140	+MCR: V32	The modem has connected to the line with ITU-T V.32 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
141	+MCR: V32B	The modem has connected to the line with ITU-T V.32 bis modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
142	+MCR: V34	The modem has connected to the line with ITU-T V.34 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
144	+MCR: K56	The modem has connected to the line with K56flex modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
145	+MCR: V90	The modem has connected to the line with ITU-T V.90 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
150	+MRR: 32000	The modem has connected to the line at 32000 bps and carrier reporting is enabled. (See S95 and Xn.)
151	+MRR: 34000	The modem has connected to the line at 34000 bps and carrier reporting is enabled. (See S95 and Xn.)
152	+MRR: 36000	The modem has connected to the line at 36000 bps and carrier reporting is enabled. (See S95 and Xn.)
153	+MRR: 38000	The modem has connected to the line at 38000 bps and carrier reporting is enabled. (See S95 and Xn.)
154	+MRR: 40000	The modem has connected to the line at 40000 bps and carrier reporting is enabled. (See S95 and Xn.)
155	+MRR: 42000	The modem has connected to the line at 42000 bps and carrier reporting is enabled. (See S95 and Xn.)
156	+MRR: 44000	The modem has connected to the line at 44000 bps and carrier reporting is enabled. (See S95 and Xn.)
157	+MRR: 46000	The modem has connected to the line at 46000 bps and carrier reporting is enabled. (See S95 and Xn.)
158	+MRR: 48000	The modem has connected to the line at 48000 bps and carrier reporting is enabled. (See S95 and Xn.)
159	+MRR: 50000	The modem has connected to the line at 50000 bps and carrier reporting is enabled. (See S95 and Xn.)
160	+MRR: 52000	The modem has connected to the line at 52000 bps and carrier reporting is enabled. (See S95 and Xn.)
161	+MRR: 54000	The modem has connected to the line at 54000 bps and carrier reporting is enabled. (See S95 and Xn.)
162	+MRR: 56000	The modem has connected to the line at 56000 bps and carrier reporting is enabled. (See S95 and Xn.)
165	CONNECT 32000	The modem has connected to the line at 32000 bps and DCE speed reporting is enabled.
166	CONNECT 34000	The modem has connected to the line at 34000 bps and DCE speed reporting is enabled.

Code	Message	Meaning
167	CONNECT 36000	The modem has connected to the line at 36000 bps and DCE speed reporting is enabled.
168	CONNECT 38000	The modem has connected to the line at 38000 bps and DCE speed reporting is enabled.
169	CONNECT 40000	The modem has connected to the line at 40000 bps and DCE speed reporting is enabled.
170	CONNECT 42000	The modem has connected to the line at 42000 bps and DCE speed reporting is enabled.
171	CONNECT 44000	The modem has connected to the line at 44000 bps and DCE speed reporting is enabled.
172	CONNECT 46000	The modem has connected to the line at 46000 bps and DCE speed reporting is enabled.
173	CONNECT 48000	The modem has connected to the line at 48000 bps and DCE speed reporting is enabled.
174	CONNECT 50000	The modem has connected to the line at 50000 bps and DCE speed reporting is enabled.
175	CONNECT 52000	The modem has connected to the line at 52000 bps and DCE speed reporting is enabled.
176	CONNECT 54000	The modem has connected to the line at 54000 bps and DCE speed reporting is enabled.
177	CONNECT 56000	The modem has connected to the line at 56000 bps and DCE speed reporting is enabled.
178	CONNECT 230400	The modem has connected to the line, the DTE speed is 230400 bps, and DTE speed reporting is enabled.
180	CONNECT 28000	The modem has connected to the line at 28000 bps and DCE SPEED reporting is enabled.
181	CONNECT 29333	The modem has connected to the line at 29333 bps and DCE SPEED reporting is enabled.
182	CONNECT 30667	The modem has connected to the line at 30667 bps and DCE SPEED reporting is enabled.
183	CONNECT 33333	The modem has connected to the line at 33333 bps and DCE SPEED reporting is enabled.
184	CONNECT 34667	The modem has connected to the line at 34667 bps and DCE SPEED reporting is enabled.
185	CONNECT 37333	The modem has connected to the line at 37333 bps and DCE SPEED reporting is enabled.
186	CONNECT 38667	The modem has connected to the line at 38667 bps and DCE SPEED reporting is enabled.
187	CONNECT 41333	The modem has connected to the line at 41333 bps and DCE SPEED reporting is enabled.
188	CONNECT 42667	The modem has connected to the line at 42667 bps and DCE SPEED reporting is enabled.
189	CONNECT 45333	The modem has connected to the line at 45333 bps and DCE SPEED reporting is enabled.
190	CONNECT 46667	The modem has connected to the line at 46667 bps and DCE SPEED reporting is enabled.
191	CONNECT 49333	The modem has connected to the line at 49333 bps and DCE SPEED reporting is enabled.
192	CONNECT 50667	The modem has connected to the line at 50667 bps and DCE SPEED reporting is enabled.
193	CONNECT 53333	The modem has connected to the line at 53333 bps and DCE SPEED reporting is enabled.
194	CONNECT 54667	The modem has connected to the line at 54667 bps and DCE SPEED reporting is enabled.
195	+MRR: 28000	The modem has connected to the line at 28000 bps and carrier reporting is enabled. (See S95 and Xn.)
196	+MRR: 29333	The modem has connected to the line at 29333 bps and carrier reporting is enabled. (See S95 and Xn.)
197	+MRR: 30667	The modem has connected to the line at 30667 bps and carrier reporting is enabled. (See S95 and Xn.)
198	+MRR: 33333	The modem has connected to the line at 33333 bps and carrier reporting is enabled. (See S95 and Xn.)
199	+MRR: 34667	The modem has connected to the line at 34667 bps and carrier reporting is enabled. (See S95 and Xn.)
200	+MRR: 37333	The modem has connected to the line at 37333 bps and carrier reporting is enabled. (See S95 and Xn.)
201	+MRR: 38667	The modem has connected to the line at 38667 bps and carrier reporting is enabled. (See S95 and Xn.)
202	+MRR: 41333	The modem has connected to the line at 41333 bps and carrier reporting is enabled. (See S95 and Xn.)
203	+MRR: 42667	The modem has connected to the line at 42667 bps and carrier reporting is enabled. (See S95 and Xn.)
204	+MRR: 45333	The modem has connected to the line at 45333 bps and carrier reporting is enabled. (See S95 and Xn.)
205	+MRR: 46667	The modem has connected to the line at 46667 bps and carrier reporting is enabled. (See S95 and Xn.)
206	+MRR: 49333	The modem has connected to the line at 49333 bps and carrier reporting is enabled. (See S95 and Xn.)
207	+MRR: 50667	The modem has connected to the line at 50667 bps and carrier reporting is enabled. (See S95 and Xn.)
208	+MRR: 53333	The modem has connected to the line at 53333 bps and carrier reporting is enabled. (See S95 and Xn.)
209	+MRR: 54667	The modem has connected to the line at 54667 bps and carrier reporting is enabled. (See S95

Code	Message	Meaning
		and Xn.)

Notes:

1. See Vn for result code selection, i.e., short form (result code) or verbose/extended (result message).
2. See Wn for extended connect message control.
3. See S95 for extended result code enabling options (which override some Wn commands).
4. See Xn for extended result code subset enabling options.
5. See \Vn for single line connect message enable options.
6. See +MR for modulation reporting control.

This page is intentionally blank.

4 Fax Class 1 and Fax Class 1.0 Commands

4.1 Fax I/O Processing

The fax I/O interface supports asynchronous serial and parallel interfaces. The character format is 8 bits data, no parity, and 1 stop bit. Start and stop elements are removed from the transmit data and added to the receive data. Both transmit and receive data are buffered. Flow control using XON/XOFF or RTS/CTS is provided.

Unique control character strings are identified, filtered, or reinserted into the I/O data stream. These control characters and their resultant action are described below.

4.1.1 DTE-to-Modem Transmit Data Stream

Characters Detected	Action Taken
<DLE><data>	Delete <DLE><data> characters.
<DLE><ETX>	Recognize as a string terminator and take appropriate action.
<DLE><DLE>	Replace with single <DLE> character.

4.1.2 Modem-to-DTE Receive Data Stream

Characters Detected	Action Taken
<DLE>	Insert extra <DLE> ahead of <DLE>.

The modem also identifies the end of a frame by inserting <DLE><ETX> into the data stream after the FCS bytes.

4.1.3 Fax Mode Selection

Fax Class 1 and Fax Class 1.0 commands are identified in Table 4-1. Fax Class 1.0 includes all Fax Class 1 commands.

Table 4-1. Fax Class 1 and Fax Class 1.0 Commands

Command/Parameter	Function	Applicable in Fax Class 1	Applicable in Fax Class 1.0
+FCLASS=<class>	Select, read or test service class	X	X
+FAA=<value>	Auto answer enable	-	X
+FAE=<value>	Auto answer enable	X	X
+FTS=<time>	Stop transmission and pause	X	X
+FRS=<time>	Wait for silence	X	X
+FTM=<mod>	Transmit data with <mod> carrier	X	X
+FRM=<mod>	Receive data with <mod> carrier	X	X
+FTH=<mod>	Transmit HDLC data with <mod> carrier	X	X
+FRH=<mod>	Receive HDLC data with <mod> carrier	X	X
+FAR=<off/on>	Adaptive reception control	-	X
+FCL=<time>	Carrier loss timeout	-	X
+FDD=<value>	Double escape character replacement control	-	X
+FIT=<time>, <action>	DTE inactivity timeout	-	X
+FPR=<rate>	Fixed DTE Rate	-	X
+FMI?	Report manufacturer ID	-	X
+FMM?	Report model ID	-	X
+FMR?	Report revision ID	-	X
+FLO	Flow Control	-	X
&K	Local DTE-modem flow control (see Section 0)	X	X
A	Answer (see Section 0)	X	X
D <string>	Dial (see Section 0)	X	X
H	Hangup (see Section 0)	X	X
X = Applicable; - = Not applicable.			

4.1.4 Fax Origination

Origination of fax calls is made using the ATD command. Upon completion of the dial function, a calling tone at 1100 Hz is transmitted, with a cadence of 0.5 seconds on and 3 seconds off. The modem automatically enters mode +FRH=3 and sends the CONNECT message to the DTE when FSK flags are detected from the remote.

4.1.5 Fax Answering

Answering of fax calls is identical to answering of data calls with the exception that the modem enters the fax handshaking mode instead of the data handshaking mode after going off-hook. If +FAE=0, the modem, after sending answer tone, automatically enters fax mode (+FTH=3), sends the CONNECT message to the DTE, and starts sending FSK flags. If +FAE=1, the modem determines whether the caller is a data modem or fax modem and sends the DATA or FAX result code, respectively, to the DTE.

4.1.6 Fax Control Transmission

Fax control transmission is initiated by the +FTH=<mod> command. After this command is issued, the modem generates the CONNECT message and transmits carrier in the modulation scheme specified by the parameter n. The modem then transmits HDLC flags for a minimum of 1 second. The modem continues to transmit the HDLC flags until it receives a character from the DTE.

When characters are received from the DTE, the modem adds start and end flags, performs zero-bit insertion, generates FCS, and deletes <DLE><chr> character pairs before transmitting the characters to the remote fax machine. Each <DLE><DLE> sequence is transmitted as a single <DLE>. <DLE><ETX> is considered as the end of frame marker and is not transmitted. All data received from the DTE after <DLE><ETX> is ignored by the modem until the modem generates either the CONNECT, OK, or ERROR result code.

If no more data is in the transmit buffer and the final bit was a 1 (bit 4 of the second byte received from the DTE), the modem generates the OK result code and returns to the command mode. If the final bit was a 0, the modem generates the CONNECT message and waits for further data from the DTE while transmitting HDLC flags. If no more data is received before 5 seconds elapse, the modem drops carrier, goes on-hook, and generates the ERROR result code.

4.1.7 Fax Control Reception

Fax control reception is initiated using the AT+FRH=<mod> command. After this command is issued, the modem looks for carrier in the modulation scheme specified by the parameter n. If no carrier is detected before the period of time specified by register S7 expires, the modem generates the NO CARRIER message and returns to command mode. If a carrier is detected that is not the one specified by the parameter n, the modem generates the +FCERROR message and returns to the command mode. If the specified carrier is detected, the modem generates the CONNECT message and enters the HDLC receive mode.

In HDLC receive mode, the modem receives HDLC frames from the remote fax machine, strips the flags, performs zero-bit deletion, performs error checking, and handles <DLE><chr> character pairs before passing the data to the DTE. The modem prefixes each <DLE> character with another <DLE> character before sending it to the DTE. After

the last byte in the frame, the modem sends <DLE><ETX> to the DTE marking the end of the frame. The modem then generates either the OK message if no errors were detected or the ERROR message if errors were detected (FCS is incorrect), and returns to command mode.

While in command mode, the modem continues to receive data in the selected modulation scheme, and sends the data after sending the CONNECT message to the DTE when the DTE reissues the +FRH command with the same parameter. If the DTE issues the +FRH command with a different parameter, the modem clears all buffers and proceeds as described previously.

If carrier is lost while in command mode and the DTE reissues the +FRH command with the same parameter, and there is no data in the buffer, the modem sends the ERROR result code to the DTE and returns to the command mode. If there is data in the buffer, the modem sends the next frame of buffered data to the DTE, followed by <DLE><ETX>, and either the ERROR result code if errors were detected or the OK result code if no errors were detected. The modem then returns to command mode.

The modem concludes an error is detected if carrier is lost for any period of time during or before the reception of a frame. If carrier is lost for a time period longer than the time specified by the register S10, the modem finishes delivering the data in the receive buffer (if any) to the DTE, sends <DLE><ETX>, generates the ERROR message, and returns to command mode. All subsequent data received from the remote is discarded.

If the modem detects a frame abort sequence (seven consecutive ones with no zero insertion) while it is waiting for a frame beginning flag (it was receiving HDLC flags), it will wait for the HDLC flags again until either carrier is lost, or the DTE aborts the process by sending an abort character or by dropping DTR with &D2 in effect. If the frame abort sequence is detected while the modem is receiving a frame it finishes delivering the data in the receive buffer (if any) to the DTE, sends <DLE><ETX>, generates the ERROR message, and returns to command mode. The modem keeps looking for HDLC flags followed by more data from the remote, with the selected modulation scheme.

If the modem detects a receive buffer overflow condition, it concludes that there was an FCS error in that frame. The modem will receive more frames only if a starting flag is detected and there is room in the receive buffer. If a starting flag is detected and there is no room in the buffer, the modem discards all data in that frame.

If the modem receives any character from the DTE after the +FRH command (except flow control characters if software flow control is in effect), or if the modem detects a high-to-low transition of the DTR signal while &D1 is in effect, it sends <DLE><ETX> to the DTE, generates OK result code, and returns to command mode. The receive buffer is cleared and all data received from the remote is discarded. If the modem detects a DTR drop while &D2 is in effect, it goes on-hook, sends <DLE><ETX> to the DTE, generates OK result code, and returns to command mode. If the modem detects a DTR drop while &D3 is in effect, the modem performs a warm reset.

4.1.8 Fax Data Transmission

Fax data transmission is initiated by the AT+FTM=<mod> command. After this command is issued, the modem generates the CONNECT message and transmits carrier in the modulation scheme specified by the parameter n. The modem then transmits constant 1 bits for a minimum of one second and continues to transmit constant 1 bits until it receives a character from the DTE.

When data is received from the DTE, the modem deletes start and stop bits and deletes all <DLE><chr> character pairs before transmitting the data to the remote. Each <DLE><DLE> sequence is transmitted as a single <DLE>. <DLE><ETX> is considered

as the end of stream marker, and is not transmitted. All data received from the DTE after the <DLE><ETX> is ignored by the modem until the modem generates either the CONNECT, OK, or ERROR result code.

If no more data is in the transmit buffer, and the last transmitted character was not an ASCII NULL, the modem generates the OK result code and returns to the command mode. If the last character transmitted was an ASCII NULL, the modem generates the CONNECT message to the DTE and waits for further data from the DTE while transmitting NULLs to the remote. If more data is received before five seconds elapse, the modem continues to transmit the data as described in the previous paragraph. If five seconds elapse and no data is received from the DTE, the modem drops carrier, goes on-hook, and generates the ERROR result code.

4.1.9 Fax Data Reception

Fax data reception is initiated using the AT+FRM=<mod> command. After this command is issued, the modem looks for carrier in the modulation scheme specified by the parameter n. If no carrier is detected before the period of time specified by register S7 expires, the modem generates the NO CARRIER message and returns to command mode. If a V.21 carrier is detected when a high speed carrier is expected, the modem generates the +FCERROR message and returns to the command mode. If the specified carrier is detected, the modem generates the CONNECT message and enters the data receive mode.

While in data receive mode, the modem receives data from the remote, adds start and stop bits, and handles <DLE><chr> character pairs before passing the data to the DTE. The modem prefixes each <DLE> character with another <DLE> character before sending it to the DTE.

If the modem detects a receive buffer overflow condition, it stops receiving from the remote until there is room in the receive buffer. The modem informs the DTE of the buffer overflow after it sends to the DTE the last character that was stored in the buffer before the overflow occurred.

If the modem receives any character from the DTE after the +FRM command (except flow control characters if software flow control is in effect), or if the modem detects a high-to-low transition of the DTR signal while &D1 is in effect, it sends <DLE><ETX> to the DTE, generates the OK result code, and returns to command mode. The receive buffer is cleared and all data received from the remote is discarded. If loss of DTR is detected while &D2 is in effect, the modem goes on-hook, sends <DLE><ETX> followed by OK result code to the DTE, and returns to command mode. If the modem detects a DTR drop while &D3 is in effect, the modem performs a warm reset.

4.2 Commands and Parameters

4.2.1 Mode Entry Commands

+FCLASS=1 - Select Facsimile Class 1 Mode

+FCLASS=1 selects the Fax Class 1 Mode. The Fax Class 1 Mode commands and responses described in this section are applicable when command +FCLASS=1 as shown in Table 4-1.

+FCLASS=1.0 - Select Facsimile Class 1.0 Mode

+FCLASS=1.0 selects the Fax Class 1.0. The Fax Class 1.0 Mode commands and responses described in this section are applicable when command +FCLASS=1.0 as shown in Table 4-1.

4.2.2 Mode Commands

+FAA - Auto Answer Enable

This command enables or disables fax adaptive answer. This command operates identically to the +FAE command.

Syntax

+FAA=<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disable data /fax auto answer mode. (Default.)
1	Enable data /fax auto answer mode. The modem determines the calling type and issues DATA result code (13) if the caller is a data modem or issues FAX result code (15) if the caller is a fax modem.

+FAE - Auto Answer Enable

This command enables or disables fax adaptive answer. This command operates identically to the +FAA command.

Syntax

+FAE=<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disable data /fax auto answer mode. (Default.)
	1	Enable data /fax auto answer mode. The modem determines the calling type and issues DATA result code (13) if the caller is a data modem or issues FAX result code (15) if the caller is a fax modem.

After a data (not fax) connection is achieved (indicated by the DATA result code), the DTE must issue an ATO command to cause the modem to go on-line.

+FTS - Transmit Silence

This command causes the modem to terminate a transmission and wait for <time> 10-ms intervals before responding with the OK result code.

Syntax

+FTS=<time>

Defined Values

<time>	Decimal number from 0 (default) to 255 which specifies the length of time in 10-ms intervals to delay before responding with the OK result code after terminating the session.

Result Codes

OK	Reported when transmission has been terminated for the specified amount of time.
ERROR	<value> is invalid or this command is issued while the modem is on-hook.

Reporting Supported Range of Parameter Values

Command: +FTS=?

Response: +FTS: <time> range

Example: +FTS: 0-255

+FRS - Receive Silence

This command causes the modem to listen and report an OK result code when silence has been detected on the line for the specified period of time. This command will terminate when the required period of silence is detected or when the DTE sends the modem another character other than XON or XOFF, which is discarded. In either event, the OK result code is returned.

This command is aborted if any character is received from the DTE after receipt of the command but before the time delay elapses. In this case, the modem discards the aborting character and issues an OK result code.

Syntax

+FRS =<time>

Defined Values

<time>	Decimal number from 0 (default) to 255 which specifies the length of time in 10-ms intervals to delay before responding with the OK result code after detecting silence on the line.

Result Codes

OK	Reported when silence has been present on the line for the specified amount of time or when the DTE sends the modem a character other than XON or XOFF.
ERROR	<value> is invalid or this command is issued while the modem is on-hook.

Reporting Supported Range of Parameter Values

Command: +FRS=?

Response: +FRS: <time> range

Example: +FRS: 0-255

+FTM - Transmit Facsimile

This command causes the modem to transmit data using the modulation defined below. When a valid <mod> value is entered, the modem transmits the proper training sequence in the selected mode, followed by constant 1 bits until data is received from the DTE. The modem also returns the CONNECT result code at the beginning of the training sequence.

Syntax

+FTM=<mod>

Defined Values

<mod> Decimal number corresponding to the selected modulation mode and data rates shown in Table 4-2.

Table 4-2. Fax Class 1 and Fax Class 1.0 Modulation Modes and Rates

<mod>	Modulation	Training	Modulation Mode and Rate
3	V.21		300 bps
24	V.27 ter		2400 bps
48	V.27 ter		4800 bps
72	V.29		7200 bps
73	V.17	long	7200 bps long
74	V.17	short	7200 bps short
96	V.29		9600 bps
97	V.17	long	9600 bps long
98	V.17	short	9600 bps short
121	V.17	long	12000 bps long
122	V.17	short	12000 bps short
145	V.17	long	14400 bps long
146	V.17	short	14400 bps short

Result Codes

CONNECT Reported when the modems begins the training sequence after receipt of a valid <mod> value.

ERROR If the modem's transmit buffer becomes empty and the last transmitted character is NUL (00), the modem continues to transmit NULs until the DTE sends more data or five seconds elapses. After five seconds elapse with a empty transmit buffer, the modem will turn off the transmit carrier, return to the command state, and report the ERROR result code.

OK If the modem's transmit buffer becomes empty and the last transmitted character is was not NUL, the modem will turn off the transmit carrier, return to the command state, and report the OK result code.

Reporting Current or Selected Values

Command: +FTM?

Response: +FTM: <mod>

Example: +FTM: 98 For V.17 9600 bps.

Reporting Supported Range of Parameter Values

Command: +FTM=?

Response: +FTM: (<mod> range)

Example: +FTM: 3,24,48,72,73,74,96,97,98,121,122,145,146

+FRM - Receive Facsimile

This command causes the modem to enter the receiver mode using the modulation defined below.

Syntax

+FRM=<mod>

Defined Values

<mod>	Decimal number corresponding to the selected modulation mode and data rates shown in Table 4-2.

Reporting Current or Selected Values

Command: +FRM?

Response: +FRM: <mod>

Example: +FRM: 98 For V.17 9600 bps.

Reporting Supported Range of Parameter Values

Command: +FRM=?

Response: +FRM: (<mod> range)

Example: +FRM: 3,24,48,72,73,74,96,97,98,121,122,145,146

Result Codes

CONNECT	Reported when the selected carrier is detected.
+FCERROR	Reported if another carrier is detected and FAR=0; the modem then returns to the command state.
NO CARRIER	Reported if loss-of-carrier is detected.
OK	Reported if the DTE sends any character to the modem other than XON or XOFF while operating in configured flow control from the DTE; the modem then returns to the command state.

+FTH - Transmit Data with HDLC Framing

This command causes the modem to transmit data using HDLC protocol and the modulation defined below.

Syntax

+FTH=<mod>

Defined Values

<mod>	Decimal number corresponding to the selected modulation mode and data rates shown in Table 4-2.

Result Codes

CONNECT	Reported for either of two conditions: **1.** At the beginning of transmission of the training pattern for the selected modulation. **2.** If the Final Frame bit is 0.
OK	Reported for either of two conditions: **1.** If the Final Frame Bit is 1. **2.** if the DTE sends only <DLE><ETX> (a null frame) while transmitting flags.
ERROR	Reported if five seconds elapse from the time when the modem reported the CONNECT result code without any additional data transmitted from the DTE; the modem then turns off carrier and returns to the command mode.

Reporting Current or Selected Values

Command: +FTH?

Response: +FTH: <mod>

Example: +FTH: 98 For V.17 9600 bps.

Reporting Supported Range of Parameter Values

Command: +FTH?

Response: +FTH?

Example: +FTH: 98 For V.17 9600 bps.

+FRH - Receive Data with HDLC Framing

This command causes the modem to receive frames using HDLC protocol and the modulation defined below. An ERROR response code results if this command is issued while the modem is on-hook.

Syntax

+FRH=<mod>

Defined Values

<mod>	Decimal number corresponding to the selected modulation mode and data rates shown in Table 4-2.

Reporting Current or Selected Values

Command: +FRH?

Response: +FRH: <mod>

Example: +FRH: 98 For V.17 9600 bps.

Reporting Supported Range of Parameter Values

Command: +FRH?

Response: +FRH?

Example: +FRH: 98 For V.17 9600 bps.

Result Codes

CONNECT	Reported for either of two conditions: **1.** When the selected carrier is detected with an HDLC flag. **2.** If the DTE sends another +FTH=<MOD> command after sending the result code indicating frame reception is complete.
+FCERROR	Reported if a different carrier is detected and FAR=0.
NO CARRIER	Reported if loss of carrier is detected.
OK	Reported for either of two conditions: **1.** If a frame was received correctly. **2.** If the DTE sends any character other than XON or XOFF while the modem is in the configured flow control.
ERROR	Reported if a frame was received in error.

4.2.3 Service Class 1 Parameters

+FAR - Adaptive Reception Control

If Adaptive Reception is enabled, the modem adaptively detects the selected message carrier or V.21 control messages. If the expected carrier is detected, the modem operates as specified in the respective +FRM=<mod> or +FRH=<mod> commands. If V.21 flag preamble is detected instead, the modem issues a +FRH:3 intermediate result code, and then executes an implied +FRH=3 command.

Write Syntax

+FAR=<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disable Adaptive Reception. (Default.)
	1	Enable Adaptive Reception.

Reporting Current or Selected Values

Command: +FAR?

Response: +FAR: <value>

Example: +FAR: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +FAR=?

Response: +FAR: (<value> range)

Example: +FAR: (0,1)

+FCL - Carrier Loss Timeout

This parameter allows the DTE to select the modem's loss-of-carrier delay between initial loss-of-carrier and qualified loss-of-carrier, when the modem will give up and exit a receive mode. Intermediate (less than FCL timeout) loss-of-carrier should be indicated by insertion of the SQ-BAD signal quality indicator in the received data stream.

In unframed receive modes, if the modem detects RTC as described in Recommendation T.30 prior to initial loss of the high speed carrier, or if the modem detects V.21 carrier after initial loss of high speed carrier, then the modem immediately accepts the loss-of-carrier as qualified, without waiting for the FCL timer to expire.

In HDLC receive modes, if the modem detects HDLC abort prior to initial loss of the high speed carrier, or if the modem detects V.21 carrier after initial loss of high speed carrier, then the modem l immediately accepts the loss-of-carrier as qualified, without waiting for the FCL timer to expire.

Write Syntax

+FCL=<time>

Defined Values

<value>	Decimal number representing the loss-of-carrier delay time in units of 100 ms. The range is 0 - 255.

Reporting Current or Selected Values

Command: +FCL?

Response: +FCL: <time>

Example: +FCS: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +FCL=?

Response: +FCL: (<time> range)

Example: +FCL: (0-255)

+FDD - Double Escape Character Replacement

This parameter conditions the use of the □DLE□□□SUB□ pair to encode consecutive <1/0>□<1/0> in data. This may be used to prevent unbound expansion of data that contains many <1/0> patterns.

Syntax

+FDD=<value>

Defined Values

<value> Decimal number corresponding to the selected option. For modem decode of <DLE><SUB>, the defined range are:

- 0 <DLE> <DLE> or discard (default and only)
- 1 <DLE> <DLE> (not supported)

For modem encoding of <1/0> <1/0>the defined values are:

- 0 <DLE> <DLE> <DLE> <DLE> (default and only)
- 1 <DLE> <SUB> (not supported)

Reporting Current or Selected Values

Command: +FDD?

Response: +FDD: <value>

Example: +FDD: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +FDD=?

Response: +FDD: (<value> range)

Example: +FDD: (0)

+FIT - DTE Inactivity Timeout

This command specifies a DTE inactivity timeout value that allows the modem to break away from an unsuccessful connection attempt at any stage of a facsimile transfer. The DTE inactivity timer operates only while the modem is off-hook.

Syntax

+FIT=<time>,<action>

Defined Values

<time> The <time> parameter indicates the DTE inactivity timeout in seconds. The value of 0 indicates that timeout is disabled (default). The required timeout range is 1 to 255 seconds. The inactivity timer starts when the modem has taken some action that requires DTE response. If the DTE does respond, the modem resets the inactivity timer. Inactivity timer related events are listed in Table 4-3.

<action> The <action> parameter has two meanings.

- 0 Upon timeout, the modem will go on-hook, executing an implied ATH command; then reset to +FCLASS=0.
- 1 Upon timeout, the DCE will only go on-hook.

Reporting Current or Selected Values

Command: +FIT?

Response: +FIT: <time>,<action>

Example: +FIT: 0,0 For the default settings.

Reporting Supported Range of Parameter Values

Command: +FIT?

Response: +FIT: (<time> range), (<action> range)

Example: +FIT: (0-255),(0-1)

Table 4-3. Inactivity Timer Start and Stop Events

On-line state	Start timer event	Stop timer event
Waiting for a command	modem sends final result code	DTE sends AT or “at”
Waiting for transmit data	modem sends CONNECT after +FTM or +FTH command	DTE sends data
Waiting for transmit data	modem sends <XON> or sets CTS ON	DTE sends data
Waiting to deliver received data	modem sends <XOFF> after +FRM or +FRH command	DTE sends <XON>
Waiting to deliver received data	DTE sets V.24 Ckt 133 OFF after +FRM or +FRH command	DTE sets V.24 Ckt 133 ON

+FPR - Fixed DTE Rate

This numeric extended-format parameter specifies the data rate at which the modem will accept commands during on-line operation. It may be used to select operation at rates at which the modem is not capable of automatically detecting the data rate being used by the DTE. Specifying a value of 0 disables the function and allows operation only at rates automatically detectable by the modem. The specified rate takes effect following the issuance of any result code(s) associated with the current command line.

The <rate> specified does not apply in OnLine Data State if Normal Mode (Direct Mode) of operation is selected.

Syntax

+FPR=<rate code>

Defined Values

<rate code> Specifies the DTE-modem interface operation rate in bits/s with a rate code. The available rate codes are:

0	Automatic detection (default)
1	2400 bits/s (executes +IPR=2400)
2	4800 bits/s (executes +IPR=4800)
4	9600 bits/s (executes +IPR=9600)
8	19200 bits/s (executes +IPR=19200)
10	38400 bits/s (executes +IPR=38400)
18	57400 bits/s (executes +IPR=57400)

If unspecified or set to 0, automatic detection is selected and the character format is also forced to autodetect, +ICF=0.

If the rate specified is not supported by the modem, an ERROR result code will be returned.

Reporting Current or Selected Values

Command: +FPR?

Response: <rate code>

Example 1: 0 For automatic rate detection.

Example 2: 18 For 57600 bits/s.

Reporting Supported Range of Parameter Values

Command: +FPR=?

Response: (<rate code> range)

Example: (0,1,2,4,8,10,18)

+FMI? - Request Manufacturer Identification

This command causes the modem to report the modem product manufacturer.

Syntax

+FMI?

Typical Response

CONEXANT
OK

+FMM? - Request Model Identification

This command causes the modem to report the modem product model.

Syntax

+FMM?

Typical Response

V90
OK

+FMR? - Request Revision Identification

This command causes the modem to transmit one or more lines of information text identifying the modem version, revision level or date.

Syntax

+FMR?

Typical Response

V3.001-V90_2M_DLS
OK

+FLO - Flow Control

This parameter allows the DTE to identify and select the type of flow control used.

Syntax

+FLO=<method>

Defined Values

<method> Decimal number corresponding to the selected option.

0	XON/XOFF and RTS/CTS flow control turned off.
1	Use XON/XOFF flow control in either direction.
2	Use RTS for flow control of the modem by the DTE; use CTS for flow control of the DTE by the modem.

Reporting Current or Selected Values

Command: +FLO?

Response: +FLO: <method>

Example: +FLO: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +FLO=?

Response: +FLO: (<method>range)

Example: +FLO: (0-2)

Result Codes

OK	<method> = 0-2.
ERROR	Otherwise.

4.3 Examples

Examples of calling (transmitting) and answering (receiving) one page using fax class 1 commands are shown in Table 4-4 and Table 4-5, respectively. The examples show the interchange between the DTE and the modem for various cases. Comments are included to explain how to handle various situations. Commands and responses are in upper case (e.g., AT+FRH=3) and comments are in lower case. All streams of data denoted by <..frame> are terminated by the <DLE><ETX> characters.

Table 4-4. Fax Class 1 Calling Sequence (Transmitting a Single Page)

DTE Commands	Modem Responses	Local Modem Action	Remote Station Action	Notes
AT+FCLASS=1	OK	Set Class 1		
ATDT<string>	 CONNECT <NSF frame> <DLE><ETX> OK	Dial and send CNG Look for V.21 Detect flags	Answer send CED, V.21 Send HDLC flags Send NSF frame	AT+FRH=3 implied by dialing with +FCLASS=1.0
AT+FRH=3	 CONNECT <CFI frame data> <DLE><ETX> OK	 Detect flags get CSI get FCS accept FCS	 send CSI frame check FCS	 Frame status OK
AT+FRH=3	 CONNECT <DIS frame data> <DLE><ETX> OK	 Detect flags get DIS get FCS accept FCS	 send DIS frame check FCS	 DTE must detect final frame bit to anticipate loss of carrier
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	
AT+FRH=3 <TSI frame data> <DLE><ETX> <DCS frame data> <DLE><ETX>	 CONNECT CONNECT OK	send V.21 carrier send flags send TSI frame send FCS send flags send DCS frame send FCS, flags drop carrier	detect carrier detect flags get TSI frame get DCS frame	Final frame bit clear tells the modem to expect another frame. Final frame bit set tells the modem not to expect another frame
AT+FTS=8; +FTM=96 <TCF data pattern> <DLE><ETX>	 CONNECT OK	wait 80 ms send V.29 carrier send TCF data drop carrier	 detect carrier get TCF data	
AT+FRH=3	 CONNECT <CFR frame data> <DLE><ETX> OK	detect carrier detect flags get CFR frame check FCS accept FCS	send V.21 carrier send flags get CRF frame send FCS	 Final frame bit set. frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	
AT+FTM=96 <page image data> <DLE><ETX>	CONNECT OK	send V.29 carrier send page data drop carrier	detect carrier receive page	
AT+FTS=8; +FRH=3 <EOP frame data> <DLE><ETX>	 CONNECT OK	wait 80 ms send V.21 carrier send flags send EOP frame send FCS drop carrier	 detect carrier detect flags receives EOP	 final frame
AT+FRH=3	 CONNECT <MCF frame data> <DLE><ETX> OK	detect carrier detect flags get MCF frame check FCS accept FCS	send V.21 carrier send flags get MCF frame send FCS	 Final frame bit set. frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	
AT+FRH=3 <DNC frame> <DLE><ETX>	 CONNECT OK	send V.21 carrier send flags send DNC frame send FCS drop carrier	 detect carrier detect flags receive DC|NC	 final frame
ATH0	OK	hang up	hang up	

Table 4-5. Fax Class 1 Answering Sequence (Receiving a Single Page)

DTE Commands	Modem Responses	Local Modem Action	Remote Station Action	Notes
AT+FCLASS=1	OK	Set Class 1		
	RING<-	detect ringing	dials [,send CNG]	
ATA <CSI frame data> <DLE><ETX> <DIS frame data> <DLE><ETX>	 CONNECT CONNECT OK	off-hook, send CED, send V.21 carrier send flags send CSI frame send FCS send flags send DIS data send FCS and flags drop carrier	 get CED, detect carrier detect flags receive CSI get FCS get flags get DIS get flags	AT+FRH=3 implied by answering with +FCLASS=1.0. not final frame final frame
AT+FRH=3	 CONNECT <TSI frame data> <DLE><ETX> OK	detect carrier detect flags receive TSI receive FCS accept FCS	send V.21 carrier send flags send TSI frame send FCS	 frame OK
AT+FRH=3	 CONNECT <DCS frame data> <DLE><ETX> OK	 receive DCS receive FCS accept FCS	 send DCS frame send FCS	 final frame bit set frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	DTE did not check final frame bit and issued +FRH=3
AT+FTM=96	 CONNECT <TCF data> <DLE><ETX> OK	 detect carrier receive TCF detect loss-of-carrier	wait 75 ms send V.29 carrier send TCF data drop carrier	
AT+FRH=3 <CFR frame data> <DLE><ETX>	 CONNECT OK	send V.21 carrier send flags get CRF frame send FCS drop carrier	detect carrier detect flags receive CFR	 final frame
AT+FTM=96	 CONNECT <page image data> <DLE><ETX> NO CARRIER	 detect carrier receive page detect loss-of-carrier	 send V.29 carrier send page data drop carrier	
	 CONNECT <EOP frame data> <DLE><ETX> NO CARRIER	 detect carrier detect flags receive EOP receive FCS accept FCS	wait 75 ms send V.21 carrier send flags send EOP frame send FCS	 frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	
AT+FRH=3 <MCFame data> <DLE><ETX>	 CONNECT OK	send V.21 carrier send flags get MCF frame send FCS accept FCS	detect carrier detect flags receive MCF frame	 final frame
AT+FRH=3	 CONNECT <DCN frame data> <DLE><ETX> OK	detect carrier detect flags receive DCN receive FCS accept FCS	send V.21 carrier send flags send DCN frame send FCS	 frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	end of session
ATH0	OK	hang up		

This page is intentionally blank.

5 Voice Commands

5.1 Voice Commands Overview

Voice commands are identified in Table 5-1.

Table 5-1. Voice Commands

Command	Function
Configuration	
+FCLASS	Set Mode
+VCID	Caller ID (CID)
+VNH	Automatic Hang-up control
+FMI?	Manufacturer Identification
+FMM?	Product Identification
+FMR?	Version, Revision, etc.
+FLO	Flow Control
Voice	
+VIP	Voice Initialize All Parameters
+VRX	Start modem Receive (Record)
+VTS	Voice Tone Send (Send single frequency or DTMF)
+VTX	Start modem Transmit (Playback)
+VGR	Voice Gain Receive (Record Gain)
+VGT	Voice Gain Transmit (Playback Volume)
+VIT	Voice Inactivity Timer (DTE/Modem)
+VLS	Analog Source/Destination Selection
+VRA	Ringback Goes Away Timer
+VRN	Ringback Never Appeared Timer
+VSD	Silence Detection (QUIET & SILENCE)
+VSM	Compression Method Selection
+VTD	Beep Tone Duration Timer
+VDR	Distinctive Ring
+VDT	Control Tone Cadence Reporting
+VPR	Select DTE/modem Interface Rate (Turn off autobaud)
Speakerphone	
+VSP	Speakerphone ON/OFF
+VDX	Speakerphone Duplex Mode
+VGM	Microphone Gain
+VGS	Speaker Gain

5.1.1 <DLE> Shielded Event Codes Sent to the DTE

Table 5-2 lists the supported <DLE> shielded codes sent to the DTE in the expression <DLE><code>. The number in parenthesis in the second column corresponds to the T.50 equivalent.

Table 5-2. Supported <DLE> Shielded Codes Sent to the DTE

Code	T.50 Equivalent	Event Report Description
<DLE>	(1/0)	Two contiguous <DLE><DLE> codes indicate a single <DLE> in the data stream
<SUB>	(1/10)	<DLE><DLE> in the data stream
<ETX>	(0/3)	End Data State
X	(5/8)	Packet Header for the “Complex Event Detection Report”
.	(2/14)	Packet Terminator for the “Complex Event Detection Report”
/	(2/15)	Start of DTMF tone shielding
~	(7/15)	DTMF transitions to off
R	(5/2)	Ring
1	(3/1)	DTMF 1
2	(3/2)	DTMF 2
3	(3/3)	DTMF 3
4	(3/4)	DTMF 4
5	(3/5)	DTMF 5
6	(3/6)	DTMF 6
7	(3/7)	DTMF 7
8	(3/8)	DTMF 8
9	(3/9)	DTMF 9
0	(3/0)	DTMF 0
A	(4/1)	Extended Keypad DTMF A
B	(4/2)	Extended Keypad DTMF B
C	(4/3)	Extended Keypad DTMF C
D	(4/4)	Extended Keypad DTMF D
*	(2/10)	Extended Keypad DTMF E
#	(2/3)	Extended Keypad DTMF F
o	(6/15)	Receive Buffer Overrun
c	(6/3)	Facsimile Calling
e	(6/5)	Data Calling
h	(6/8)	Line Current Break (local phone goes on-hook)
H	(4/8)	Line Current Detected (local phone goes off-hook)
s	(7/3)	“Presumed Hangup”(SILENCE) Time-out
q	(7/1)	“Presumed End of Message” (QUIET) Time-out
J	(4/10)	SIT Signal
l	(6/12)	Loop Current Interruption
r	(7/2)	Ringing Tone
b	(6/2)	BUSY
d	(6/4)	DIAL TONE
u	(7/5)	Transmit Buffer Underrun
p	(7/0)	Line voltage increase
P	(5/0)	Line voltage decrease (extension pickup)
a	(6/1)	Facsimile or Data Answer
f	(6/6)	Data Answer

5.1.2 <DLE> Shielded Codes Sent to the Modem (DCE)

Table 5-3 lists the supported <DLE> shielded codes sent to the modem in the expression <DLE><code>. The number in parenthesis in the second column corresponds to the T.50 equivalent.

Table 5-3. Supported <DLE> Shielded Codes Sent to the Modem (DCE)

Code	Code	Simple Action Command Description
<DLE>	(1/0)	Two contiguous <DLE><DLE> codes indicate a single <DLE> in the data stream ("Immediate Command" or "Stream Command").
u	(7/5)	[Action Numbers 0 and 3] Increase the volume or gain by one unit ("Immediate Command").
d	(6/4)	[Action Numbers 1 and 4] Decrease the volume or gain by one unit ("Immediate Command").
p	(7/0)	[Action Number 9] Pause.
r	(7/2)	[Action Number 10] Resume.
<ETX>	(0/3)	[Action Number 11] End Voice Transmit State ("Stream Command").
<CAN>	(1/8)	[Action Number 12] Clear transmit buffer of voice data ("Immediate Command").
!	(2/1)	[Action Number 15] Receive abort ("Immediate Command").

5.2 Voice Commands

5.2.1 Configuration Commands

+FCLASS=8 - Select Voice Mode

+FCLASS=8 selects the Voice Mode. The Voice Mode commands and responses described in this section are applicable when command +FCLASS=8. (See Section 3.2.1 for the definition of the FCLASS command.)

+VNH - Automatic Hang-up Control

This command enables or disables automatic hangups.

Syntax

+VNH=<hook>

Defined Values

<hook> Decimal number corresponding to the selected option (see Table 5-4).

- 0 The modem enables automatic hangups as is normal in other modes.
- 1 The modem disables automatic hangups usually found in the other non-Voice Modes.
- 2 The modem disables automatic hangups in the other non-Voice Modes. The modem performs only a "logical" hangup (returns to OK result code).

Table 5-4. +VNH Command Behavior

	Command Response			
Command	**No Carrier Present**	**ATH**	**ATZ**	**DTR & D2**
+VNH=0	Y	Y	Y	Y
+VNH=1	N	Y	Y	Y
+VNH=2	N	N	N	Y
Notes: Y= will hang-up; N= will not hang-up. How +VNH is reset: DTE uses +VNH command to change setting. DTE issues another +FCLASS mode change without issuing another +VNH. A hang-up event occurs (see this table). DTE issues +VIP command.				

Reporting Current or Selected Values

Command: +VNH?

Response: <hook>

Example: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VNH=?

Response: (<hook> range)

Example: (0-2)

Result Codes

OK	<hook> = 0-2.
ERROR	Otherwise.

5.2.2 Voice Commands

+VIP - Voice Initialize All Parameters

This command causes the modem to initialize all voice parameters to their default values.

Syntax

+VIP

Result Code

OK	
ERROR	If not in Voice Mode.

+VRX - Start Modem Receive (Record)

This command causes the modem to start the voice reception process.

Syntax

+VRX

Result Codes

OK	
ERROR	If not in Voice Mode.

+VTR - Start Voice Transmission and Reception (Voice Duplex)

This command causes the modem to start the voice transmission and reception process (Voice Duplex) without either acoustic echo cancellation or line echo cancellation. The modem begins the Voice Duplex State by returning the CONNECT result code to the DTE. The modem then sends <DLE> shielded voice data to the DTE, and the DTE can send <DLE> shielded voice data to the modem. The modem will accept data from the DTE and send data to the DTE in the format previously selected by the +VSM command, and use the flow control method selected by the +IFC command.

The modem signals termination of the voice data stream by appending a <DLE><ETX> command and padding out to an octet boundary if needed. The modem will issue the <DLE><ETX> character pair (thereby ending the modem to DTE voice data flow) followed by the OK result code, and return to the command mode after the modem has completely transmitted the contents of its buffer.

There are two methods to leave the Voice Duplex State: the DTE sending a <DLE><^> shielded code or the inactivity timer elapsing in the modem. The Voice Command State is entered upon Voice Duplex State termination.

This command will function when the input and output are from/to the same I/O device, such as local handset, line, or mic/speaker.

Syntax

+VTR

Result Codes

OK	Upon command acceptance.
ERROR	The modem is not connected to the line and a non-line device.

+VTS - Send Voice Tone(s)

This command causes the modem to send DTMF digit or hookflash tones with the duration specified by +VTD, to send DTMF digit or hookflash tones with duration specified by this command, or to send single or dual tone frequencies with duration specified with this command.

Syntax

+VTS=<string>

Defined Values

<string>

The tone generation consists of elements in a list where each element is separated by a comma. Each element can be:

1. A single character which the modem interprets as a DTMF digit (0 - 9, #, *, or A-D) or hookflash (!), with a duration given by the +VTD command.
2. A 3-element string enclosed in square brackets, "[freq1,freq2,dur]", which the modem interprets as a general dual tone and duration selection, or
3. A 2-element string enclosed in curly braces, "{X,dur}", which the modem interprets as a DTMF digit (0 - 9, #, *, or A-D), or hookflash (!) with a duration (dur) different than that given by the +VTD command.

Missing subparameters assume the default value. Unspecified values always default to zero for frequencies, DTMF * for DTMF tones, and +VTD for duration. The omission of commas (and associated subparameters) are valid.

The quantity in the square brackets consists of a 3-element list (freq1,freq2,dur), which can be used to send single or dual tones. The first element is the first frequency (freq1) with range 0 or 200-3000 Hz. The second element is the second frequency (freq2), with range 0 or 200-3000 Hz. The third element is the duration (dur) in 0.01 second intervals with range 0-255 (ASCII units of 10 ms). A list may contain null elements. For example [3000] means that the DCE generates a single tone at 3000 Hz for the default duration, [3000,3300] means that the DCE generates a dual tone at 3000 and 3300 Hz for the default duration, and [,3300] means that the DCE generates a single tone at 3300 Hz for the default duration.

The quantity in the curly braces consists of a 2-element list (X,dur), which can be used to send DTMF tones or hookflash. The first element is the DTMF tone or hookflash (!) character (X), and the second element is the duration (dur) in 0.01 seconds. The characters are of the same set given above. A list may contain null elements. For example, {2} means DTMF tone "2" for the default duration, and {} means silence for the default duration.

The modem will stop the tone generation at the point in the string where the modem detects a parsing error, encounters an invalid frequency range, encounters a <CR>, or encounters a semi-colon.

Reporting Supported Range of Parameter Values

Command: +VTS=?

Response: (<freq1> range), (<freq2> range), (<dur> range)

Example: (200-3000),(200-3000),(0-255)

OK

Result Codes

OK	Valid command.
ERROR	The <string> command is invalid, or a selected frequency is out of range.

Example 1. This example illustrates tone generation without using any null elements. The command example is followed by a description of command execution.

AT+VTS= {!,30},1,2,[1000,1300,50],!,{*,6},[800,1300,50],9

1. Hookflash with a duration of 300 ms.
2. Play DTMF 1 with a duration given by the +VTD command.
3. Play DTMF 2 with a duration given by the +VTD command.
4. Play tone pair at 1 000 Hz and 1 300 Hz with a duration of 500 ms.
5. Hookflash with a duration given by the +VTD command.
6. Play DTMF * with a duration of 60 ms.
7. Play tone pair at 800 Hz and 1300 Hz with a duration of 500 ms.
8. Play DTMF 9 with a duration given by the +VTD command.

Example 2. This example illustrates tone generation using null elements. The command example is followed by a description of command execution.

AT+VTS=1,2,[1000,1300,50],[800],9

1. Play DTMF 1 with a duration given by the +VTD command.
2. Play DTMF 2 with a duration given by the +VTD command.
3. Play tone pair at 1000 Hz and 1300 Hz with a duration of 500 ms.
4. Play tone pair at 800 Hz with a duration given by the +VTD command.
5. Play DTMF 9 with a duration given by the +VTD command.

Example 3. This example illustrates tone generation using null elements and periods of silence. The command example is followed by a description of command execution.

AT+VTS=1,[,,50],2,[],9

1. Play DTMF 1 with a duration given by the +VTD command.
2. Play silence with a duration of 500 ms.
3. Play DTMF 2 with a duration given by the +VTD command.
4. Play silence with a duration given by the +VTD command.
5. Play DTMF 9 with a duration given by the +VTD command.

+VTX - Start Modem Transmit (Playback)

This command causes the modem to start the voice transmission process.

Syntax

+VTX

Result Codes

CONNECT	The modem accepts the command.
ERROR	The modem is not connected to at least one off-hook telephone line or one non-telephone line.

+VGR - Voice Gain Receive (Record Gain)

This command causes the modem to set the gain for received voice samples.

Syntax

+VGR=<gain>	0 (only valid number) selects automatic gain control

Reporting Current or Selected Values

Command: +VGR?

Response: <gain>

Example: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VGR=?

Response: <gain> range

Example: 0

Result Codes

OK	<gain> = 0.
ERROR	Otherwise, or if not in Voice Mode.

+VGT - Voice Gain Transmit (Playback Volume)

This command causes the modem to set the volume level.

Syntax

+VGT=<level>

Defined Values

<level>	Decimal number corresponding to the volume level.

Reporting Current or Selected Values

Command: +VGT?

Response: <level>

Example: 128 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VGT=?

Response: <level> range

Example: 0-255

Result Codes

OK	<level> = 0-255.
ERROR	Otherwise, or if not in Voice Mode.

+VIT - Voice Inactivity Timer (DTE/Modem)

This command sets the modem's initial value for the DTE/modem inactivity timer.

Syntax

+VIT=<timer>

Defined Values

<timer>	Decimal number corresponding to the time in units of 1.0 second. A value of 0 disables the timer.

Reporting Current or Selected Values

Command: +VIT?

Response: <timer>

Example: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VIT=?

Response: <timer> range

Example: 0-255

Result Codes

OK	<timer> = 0-255.
ERROR	Otherwise, or if not in Voice Mode.

+VLS - Analog Source/Destination Selection

This command causes the modem to select one or more source/destinations of the analog data.

Syntax

+VLS=<label>

Defined Values

<label>	Decimal number corresponding to the selected analog source/destination hardware configuration (see Table 5-5).

Command: +VLS?

Response: <label>

Example: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VLS=?

Response: <label>,<devices>,<transmit event>,<receive event>,<idle event>

Where each event subparameter is a hex number the represents an event bit field of the reporting capabilities of each state. (see Table 5-6):

<label>	Identifies the modem analog source/destination hardware configuration
<devices>	A <string constant> made up of Primitives,
<xxxx event>	<transmit event>, <receive event>, and <idle event>subparameters are the DCE event reporting capabilities for the Voice Transmit State, Voice Receive State, and the Voice Command State, respectively. Each of the event reporting subparameters is a hex number that represents an event bit field. The hex number format is defined in Table 5-6); a one in the bit field indicates that the DCE can report the associated event.

Each of the possible hardware configurations has its own <label>, ..., <idle event> description line (the above form description shows just one). A <CR><LF> terminates each description line.

Example: AT+VLS=?

```
0," ",0000000000,0000000000,B084008000
1,"T",0B8418E000,0FE418E000,0B8419E000
2,"L",0884008000,0CE4008000,0884018000
3,"LT",0B8418E000,0FE418E000,0B8419E000
4,"S",0084008000,0484008000,3084018000
5,"ST",0B8418E000,0FE418E000,0B8419E000
6,"M",0084008000,04E4008000,3084008000
8,"S1",0084008000,0484008000,3084018000
9,"S1T",0B8418E000,0FE418E000,0B8419E000
11,"M1",0084008000,04E4008000,3084008000
13,"M1S1T",0B8418E000,0FE418E000,0B8419E000
14,"H",0084008000,04E4008000,3084018000
15,"HT",0B8418E000,0FE418E000,0B8419E000
19,"M1S1",0084008000,04E4008000,3084018000
20,"t",0B8418E000,0FE418E000,BB8419E000
```

Result Codes

OK	<label> = 0-5,8-9,11,14,18-19.
ERROR	The <label> value is out of range, or if the modem cannot service the request in the <label> subparameter.

Table 5-5. +VLS Command Options

Label	Primitives	Description	+VTX	+VRX	+VSP=1
0	None	DCE on-hook. Local phone connected to the line.			
1	T	DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.	X	X	
2	L	DCE on-hook. Local phone connected to the DCE.	X	X	
3	LT	DCE off-hook. Local phone connected to the line. DCE connected to the line.	X	X	
4	S	Internal Speaker connected to the DCE. DCE on-hook. Local phone connected to the line.	X		
5	ST	Internal Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.	X	X	
6	M	Internal Microphone connected to the DCE. DCE on-hook. Local phone connected to the line.		X	
7	MST	Internal Microphone and Internal Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.			X
8	S1	External Speaker connected to the DCE. DCE on-hook. Local phone connected to the line.	X		
9	S1T	External Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.	X	X	
10	MS1T	Internal microphone and External Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.			X
11	M1	External Microphone connected to the DCE. DCE on-hook. Local phone connected to the line.		X	
12	M1ST	External Microphone and Internal Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.			X
13	M1S1T	External Microphone and External Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.			X
14	H	External Microphone and Speaker combination (handset or headset) connected to the DCE. DCE on-hook. Local phone connected to the line.	X	X	
15	HT	External Microphone and Speaker combination (handset or headset) connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.	X	X	
16	MS	Internal Microphone and Internal Speaker connected to DCE.			
17	MS1	Internal Microphone and External Speaker connected to DCE.			
18	M1S	External Microphone and Internal Speaker connected to DCE.			
19	M1S1	External Microphone and External Speaker connected to DCE.			
20	t	DCE on-hook. Line snooping of local phone connected to the line.			

Primitives (Column 2):

L	Local Phone.
T	Telephone Line.
M	Internal Microphone.
M1	External Microphone.
S	Internal Speaker.
S1	External Speaker.
H	External Microphone and Speaker combination (handset or headset).
t	Telephone Line Snooping.

Note: All label options in this table may not be supported by the product; see +VLS command.

Table 5-6. Events Detectable in the Voice Mode per V.253

Event Number	Event Description	Event Reporting
0	Caller Id Report	Message
1	DID Report	Message
2	Distinctive Ringing	Pattern
3	RING	Simple
4	DTMF Received	Simple
5	Receive Buffer Overrun	Simple
6	Facsimile Calling (e.g., 1100 Hz)	Simple
7	Data Calling (e.g., 1300 Hz)	Simple
8	Local Phone On/Off-hook	Simple
9	Presumed Hangup (SILENCE) Time-out	Simple
10	Presumed End of Message (QUIET) Time-out	Simple
11	SIT Signal	Simple, Message
12	Bong Tone	Simple
13	Loop Current Interruption	Simple
14	Loop Current Polarity Reversal	Simple
15	Call Waiting Beep/Interrupt	Simple
16	Distinctive Call Waiting	Pattern
18	Ringing Tone	Simple
19	BUSY	Simple
20	DIAL TONE	Simple
21	Reorder/Fast Busy	Simple
22	V.21 Channel 2 7E flags	Simple
23	Transmit Buffer Underrun	Simple
24	Extension Phone On/Off-hook	Simple
25	Facsimile or Data Answer (e.g., 2100 Hz)	Simple
26	Data Answer (e.g., 2225 Hz)	Simple
27	Voice Detect	Simple
29	Stuttered Dial tone	Simple (note 1)
30	Invalid Voice Data Format	Simple
31	Lost Data Detected Event	Simple
32	Facsimile Answer	Simple

Legend:

This table lists events without any regard as to whether the DCE reporting of the event is optional or mandatory, and without assigning a DCE reporting mechanism.

The first column lists the event number assignment for each event. The event number also serves another purpose; each number is a bit position in a bit field. Event number 0 is the most significant bit of the left most hex number in a hex representation (V.253 defines a total of eight hex digits). The final bit in the bit field occupies the least significant bit position of the right-most hex number. The bit representations of the event numbers are used in the +VLS= command.

The third column lists whether a single character is enough to report the event, or if the DCE must supply a more complicated report. The description Simple indicates a single character response (<DLE> shielded), Message indicates a full text message (<DLE><X> packet), and Pattern indicates a repeating Message.

Notes:

1. The use of complex event reporting for Stuttered Dial tone is for further study.

+VRA - Ringback Goes Away Timer

This command sets the length of time the modem will wait between ringbacks during call origination before the modem can assume that the remote station has gone off-hook.

Syntax

+VRA=<interval>

Defined Values

<interval>	Decimal number (0-255) specifying the silence interval time in units of 0.10 second between the end of one ring interval and the start of the next ring interval. A value of 0 forces the modem to report the OK result code immediately after the first Ringback. The range is 0.1 to 25.5 seconds for <interval> = 1 to 255.

Reporting Current or Selected Values

Command: +VRA?

Response: <interval>

Example: 50 (5 seconds) For the default setting.

Reporting Supported Range of Parameter Values

Command: +VRA=?

Response: (<interval> range)

Example: (0-255) 255 = 25.5 sec

Result Codes

OK	<interval> = 0-255
ERROR	Otherwise, or if not in Voice Mode.

+VRN - Ringback Never Appeared Timer

This command sets the length of time the modem will wait between ringbacks during call origination before the modem can assume that the remote station has gone off-hook.

Syntax

+VRN=<interval>

Defined Values

<interval>	Decimal number specifying the time period, in units of 1.0 second, that the modem will wait for Ringback during call origination. A value of 0 forces the modem to report the OK result code immediately after dialing. The range is 1 to 25 seconds for <interval> = 1 to 25.

Reporting Current or Selected Values

Command: +VRN?

Response: <interval>

Example: 10 (10 seconds) For the default setting.

Reporting Supported Range of Parameter Values

Command: +VRN=?

Response: (<interval> range)

Example: (0-25)

Result Codes

OK	<interval> = 0-25
ERROR	Otherwise, or if not in Voice Mode.

+VSD - Silence Detection (Quiet and Silence)

This command causes the modem to set the silence detection sensitivity and the required period of silence before the modem reports silence detected at the end of a voice receive either with the "Presumed End of Message" (QUIT) or "Presumed Hangup (SILENCE) event reports.

Syntax

+VSD=<sds>,<sdi>

Defined Values

<sds> Decimal number corresponding to the selected parameter.

- 0 Use +VSM silence compression setting and algorithm for long-term silence detection (if +VSM is in use) or proprietary silence compression setting and algorithm for long-term silence detection (if +VSM is not in use).
- 127 Sets less aggressive long-term silence detection independent of presence or use of silence compression.
- 128 Sets nominal long-term silence detection independent of presence or use of silence compression.
- 129 Sets more aggressive long-term silence detection independent of presence or use of silence compression.

<sdi> Decimal number specifying the required period of silence, in units of 0.1 second, before the modem can report silence detected at the end of a voice receive either with the "Presumed End of Message" (QUIT) or "Presumed Hangup (SILENCE) event reports. A value of 0 disables the modem silence detection. The range is 0.1 to 25.5 seconds for <sdi> = 1 to 255.

Reporting Current or Selected Values

Command: +VSD?

Response: <sds>,<sdi>

Example: 0,50 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VSD=?

Response: (<sds> range),(<sdi> range)

Example: (0,127-129),(0-255)

Result Codes

OK <hook> = 0 or 1.

ERROR Otherwise, or if not in Voice Mode.

+VSM - Compression Method Selection

This command causes the modem to set the voice compression method, the silence compression sensitivity, and the voice sampling rate.

Syntax

+VSM=<cml>,<vsr>,<sds>,<sel>

Defined Values

<cml>	Decimal number identifying the compression method.
<vsr>	<range of values> containing the supported range of voice samples per second of the analog signal.
<scs>	<range of values> containing the supported range of sensitivity settings for voice receives.
<sel>	<range of values> containing the supported range of expansion values for voice transmits.

Reporting Current or Selected Values

Command: +VSM?

Response: <cml>,<vsr>,<sds>,<sel>

Example: 1,8000,0,0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VSM=?

Response: <cml>,<cmid>,<bps>,<tm>,<vsr>,<sds>,<sel>

<cml>	Decimal number identifying the compression method (1, 129, 130, 140, or 141).
<cmid>	Alphanumeric string describing the compression method (UNSIGNED PCM, IMA ADPCM, UNSIGNED PCM, 2 Bit ADPCM, or 4 Bit ADPCM).
<bps>	Decimal number defining the average number of bits in the compressed sample not including silence compression (2, 4 or 8).
<tm>	Decimal number (0) reporting the time interval, in units of 0.1 second, between timing marks. A value of 0 reports that timing marks are not supported.
<vsr>	<range of values> containing the supported range of voice samples per second of the analog signal (8000).
<scs>	<range of values> containing the supported range of sensitivity settings for voice receives (0). A 0 indicates not supported.
<sel>	<range of values> containing the supported range of expansion values for voice transmits (0). A 0 indicates not supported.

Example: 1,"UNSIGNED PCM",8,0,8000,0,0
129,"IMA ADPCM",4,0,8000,0,0
130,"UNSIGNED PCM",8,0,8000,0,00
140,"2 Bit ADPCM",2,0,8000,0,0
141,"4 Bit ADPCM",4,0,8000,0,0
OK

Result Codes

OK	Valid range.
ERROR	Otherwise, or if not in Voice Mode.

+VTD - Beep Tone Duration Timer

This command causes the modem to set the default DTMF/tone generation duration.

Syntax

+VTD=<dur>

Defined Values

<dur>	Decimal number specifying the default DTMF/tone generation duration in units of 0.01 second. A value of 0 specifies the value entered by the S11 parameter (50-255 ms). The range is 0.01 to 2.55 seconds for <dur> = 1 to 255.

Reporting Current or Selected Values

Command: +VTD?

Response: <dur>

Example: 100 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VTD=?

Response: (<dur> range)

Example: (0-255)

Result Codes

OK	<dur>= 0-255.
ERROR	Otherwise, or if not in Voice Mode.

+VDR - Distinctive Ring

This command causes the modem to enable or disable reporting of the ring cadence information and to control the timing of the RING event code report if ring cadence reporting is enabled.

Syntax

+VDR=<enable>, <report>

Defined Values

<enable> Decimal number corresponding to the selected option.

- 0 The modem will not report ring cadence information.
- 1 The modem will report ring cadence information as specified for the <report> subparameter.

<report> Decimal number specifying ring cadence information report when enabled by the <enable> subparameter.

- 0 The modem will produce only DROF and DRON messages. The modem will not produce any RING event codes. The modem will report other call progress event codes as normal.
- Other The modem will produce only DROF and DRON messages. The modem will produce a RING event code after <report>/10 seconds after the falling edge of the ring pulse (i.e., after the DRON report).

Reporting Current or Selected Values

Command: +VDR?

Response: <enable>,<report>

Example: 0,0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VDR=?

Response: (<enable> range),(<report>range)

Example: (0,1),(0-6)

Result Codes

OK	<enable>,<report> = (0,1),(0-6)
ERROR	Otherwise, or if not in Voice Mode.

+VDT - Control Tone Cadence Reporting

This command is included for compatibility only and has no effect other than returning a result code.

This command allows the modem to enable or disable reporting of the control tone cadence information in the frequency band used by the Ringback/Remote Ring, BUSY, and reorder/Fast Busy tones (usually in the 300 to 600 Hz range).

Syntax

+VDT=<enable>,<report>

Defined Values

<enable>	Decimal number corresponding to the selected option.	
	0	The modem will not produce any control tone cadence report.
<report>	Decimal number specifying the produced any control tone cadence report when enabled by the <enable> subparameter.	
	0	The modem will produce only CPOF and CPON messages.
	Other	Reserved.

Reporting Current or Selected Values

Command: +VDT?

Response: <enable>,<report>

Example: 0,0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VDT=?

Response: (<enable> range),(<report> range)

Example: (0),(0)

Result Codes

OK	<enable>,<report> = (0),(0)
ERROR	Otherwise, or if not in Voice Mode.

+VPR - Select DTE/Modem Interface Rate (Turn Off Autobaud)

This command selects the DTE/modem interface rate.

Syntax

+VPR=<rate>

Defined Values

<rate>> Decimal number corresponding to the DTE/modem interface rate where 0 = autobaud rate determined by processing the AT command, and 1,2,3,4,8,16,24,48,96 correspond to multipliers of 2400 bps to determine the actual rate:

0 = Autobaud
1 = 2400 bps
2 = 4800 bps
3 = 7200 bps
4 = 9600 bps
8 = 19200 bps
16 = 38400 bps
24 = 57600 bps
48 = 115200 bps
96 = 230400 bps

Reporting Current or Selected Values

Command: +VPR?

Response: <rate>

Example: 0 For the default setting (Autobaud).

Reporting Supported Range of Parameter Values

Command: +VPR=?

Response: (<rate> range)

Example: (0,1,2,3,4,8,16,24,48,96)

Result Codes

OK	<rate> = 0,1,2,3,4,8,16,24,48,96.
ERROR	Otherwise, or if not in Voice Mode.

5.2.3 Speakerphone Commands

+VSP - Speakerphone ON/OFF

This command turns the speakerphone ON or OFF

Syntax

+VSP=<mode>

Defined Values

<mode>	Decimal number corresponding to the selected option.	
	0	The speakerphone function is OFF. (Default.)
	1	The speakerphone function is ON.

Reporting Current or Selected Values

Command: +VSP?

Response: <mode>

Example: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VSP=?

Response: (<mode> range)

Example: (0,1)

Result Codes

OK	<mode> = 0 or 1.
ERROR	Otherwise, or if not in Voice Mode.

+VDX - Speakerphone Duplex Mode

This command selects speakerphone full duplex mode.

Syntax

+VDX=<mode>

Defined Values

<mode>	Decimal number corresponding to the selected option.	
	1	The speakerphone mode is full duplex.

Reporting Current or Selected Values

Command: +VDX?

Response: <mode>

Example: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VDX=?

Response: (<mode> range)

Example: (1)

Result Codes

OK	<mode> = 1.
ERROR	Otherwise, or if not in Voice Mode.

+VGM - Microphone Gain

This command causes the modem to set the microphone gain of the speakerphone function.

Syntax

+VGM=<gain>

Defined Values

<gain>	Decimal number between 0 and 255 corresponding to the gain.

Reporting Current or Selected Values

Command: +VGM?

Response: <gain>

Example: 64 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VGM=?

Response: <gain> range

Example: 0-255

Result Codes

OK	<gain> = 0-255.
ERROR	Otherwise, or if not in Voice Mode with speakerphone enabled (+VSP=1).

+VGS - Speaker Gain

This command causes the modem to set the speaker gain of the speakerphone function.

Syntax

+VGS=<gain>

Defined Values

<gain>	Decimal number between 0 and 255 corresponding to the gain.

Reporting Current or Selected Values

Command: +VGS?

Response: <gain>

Example: 128 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VGS=?

Response: <gain> range

Example: 0-255

Result Codes

OK	<gain> = 0-255.
ERROR	Otherwise, or if not in Voice Mode with speakerphone enabled (+VSP=1).

Index

#

#UD – Last Call Status Report 3-84

$

$F – Fast Connect Control 3-95

%

%7 - Plug and Play Serial Number 3-12
%8 - Plug and Play Vendor ID and Product Number 3-13
%C - Enable/Disable Data Compression 3-77
%E - Enable/Disable Line Quality Monitor 3-61
%L - Report Line Signal Level 3-48
%Q - Report Line Signal Quality 3-48
%TT - PTT Test Command 3-92

&

&C - RLSD (DCD) Option 3-24
&D - DTR Option 3-24
&F - Restore Factory Configuration 3-10
&G - Select Guard Tone 3-44
&K - Flow Control 3-25
&L - Leased Line Operation 3-93
&M - Asynchronous/Synchronous Mode Selection 3-26
&P - Select Pulse Dial Make/Break Ratio 3-44
&Q - Sync/Async Mode 3-27
&R - RTS/CTS Option 3-28
&S - DSR Override 3-28
&T - Local Analog Loopback Test 3-10
&V - Display Current Configuration 3-45
&V1 - Display Last Connection Statistics 3-46
&W - Store Current Configuration 3-11
&X - Select Synchronous Clock Source 3-29
&Y - Designate a Default Reset Profile 3-11
&Zn=x - Store Telephone Number 3-12

)

)M - Enable Cellular Power Level Adjustment 3-93

***

**- Load Flash Memory 3-14
*B - Display Blacklisted Numbers 3-48
*D - Display Delayed Numbers 3-49

:

:E - Compromise Equalizer Enable Command 3-94

@

@M - Initial Cellular Power Level Setting 3-94

+

+A8E - V.8 and V.8bis Operation Controls 3-78
+A8I: - CI Signal Indication 3-79
+DR - Data Compression Reporting 3-75
+DS - Data Compression 3-73
+DS44 - V.44 Compression Select 3-74
+EB - Break Handling in Error Control Operation 3-65
+EFCS - 32-bit Frame Check Sequence 3-66
+ER - Error Control Reporting 3-67
+ES - Error Control and Sync Mode Selection 3-63
+ESA - Configure Synchronous Access Submode 3-80
+ESR - Selective Repeat 3-65
+ETBM - Call Termination Buffer Management 3-69
+FAA - Auto Answer Enable 4-6
+FAE - Auto Answer Enable 4-7
+FAR - Adaptive Reception Control 4-13
+FCL - Carrier Loss Timeout 4-14
+FCLASS- Select Active Service Class 3-2
+FCLASS=1 - Select Facsimile Class 1 Mode 4-6
+FCLASS=1.0 - Select Facsimile Class 1.0 Mode 4-6
+FCLASS=8 - Select Voice Mode 5-4
+FDD - Double Escape Character Replacement 4-15
+FIT - DTE Inactivity Timeout 4-16
+FLO - Flow Control 4-19
+FMI? - Request Manufacturer Identification 4-18
+FMM? - Request Model Identification 4-18
+FMR? - Request Revision Identification 4-18
+FPR - Fixed DTE Rate 4-17
+FRH - Receive Data with HDLC Framing 4-12
+FRM - Receive Data 4-10
+FRS - Receive Silence 4-8
+FTH - Transmit Data with HDLC Framing 4-11
+FTM - Transmit Facsimile 4-9
+FTS - Transmit Silence 4-7
+GCAP - Request Complete Capabilities List 3-8
+GCI - Country of Installation 3-9
+GMI - Request Conexant Identification 3-7
+GMI - Request Manufacturer Identification 3-7
+GMM - Request Model Identification 3-8
+GMR - Request Revision Identification 3-8
+H - Enable/Disable RPI and DTE Speed 3-82
+IBC – In Band Commands 3-34
+IFC - DTE-Modem Local Flow Control 3-31
+ILRR - DTE-Modem Local Rate Reporting 3-32
+IPR - Fixed DTE Rate 3-30
+ITF - Transmit Flow Control Thresholds 3-83
+MR - Modulation Reporting Control 3-59
+MS - Modulation Selection 3-57
+PCW - Call Waiting Enable 3-96
+PIG - PCM Upstream Ignore 3-100
+PMH - Modem-on-Hold Enable 3-97
+PMHF - V.92 Modem-on-Hold Hook Flash 3-100
+PMHR - Initiate Modem-on-Hold 3-99
+PMHT – Modem-on-Hold Timer 3-98
+PQC - V.92 Phase 1 and Phase 2 Control 3-101
+PSS - Use Short Sequence 3-102
+VCID - Caller ID (CID) 3-3
+VDR - Distinctive Ring 5-20
+VDT - Control Tone Cadence Reporting 5-21
+VDX - Speakerphone Duplex Mode 5-24
+VGM - Microphone Gain 5-25

+VGR - Voice Gain Receive (Record Gain)....5-9
+VGS - Speaker Gain....5-26
+VGT - Voice Gain Transmit (Playback Volume)....5-10
+VIP - Voice Initialize All Parameters....5-5
+VIT - Voice Inactivity Timer (DTE/Modem)....5-11
+VLS - Analog Source/Destination Selection....5-11
+VNH - Automatic Hang-up Control....5-4
+VPR - Select DTE/Modem Interface Rate....5-22
+VRA - Ringback Goes Away Timer....5-15
+VRID - Caller ID (CID)....3-4
+VRN - Ringback Never Appeared Timer....5-16
+VRX - Start Modem Receive (Record)....5-5
+VSD - Silence Detection (Quiet and Silence)....5-17
+VSM - Compression Method Selection....5-18
+VSP - Speakerphone ON/OFF....5-23
+VTD - Beep Tone Duration Timer....5-19
+VTR - Start Voice Transmission and Reception (Voice Duplex)....5-6
+VTS - Send Voice Tone(s)....5-7
+VTX - Start Modem Transmit (Playback)....5-9

A

A - Answer....3-40

B

B - CCITT or Bell....3-62
\B - Transmit Break to Remote....3-70

D

D - Dial....3-37

E

E - Command Echo....3-17

H

H - Disconnect (Hang-Up)....3-41

I

I - Identification....3-6

K

\K - Break Control....3-71
-K - MNP Extended Services....3-72

L

L - Speaker Volume....3-43

M

M - Speaker Control....3-43

N

\N - Operating Mode....3-5

O

O - Return to On-Line Data Mode....3-42

P

P - Set Pulse Dial Default....3-40
–PPD= - Extension Pickup Notification....3-49

Q

Q - Quiet Results Codes Control....3-17
-QCPC - Force Full Startup Procedure Next Connection....3-103
-QCPS - Enable Quick Connect Profile Save....3-103

S

S - Read/Write S-Parameter....3-104
S0 - Number of Rings to Auto-Answer....3-106
S1 - Ring Counter....3-106
S10 - Lost Carrier To Hang Up Delay....3-108
S11 - DTMF Tone Duration....3-108
S12 - Escape Prompt Delay (EPD)....3-109
S14 - General Bit Mapped Options Status....3-109
S16 - Test Mode Bit Mapped Options Status....3-109
S17 - Point Of Sale Options Selection....3-110
S19 - Reserved....3-111
S2 - Escape Character....3-106
S20 - Reserved....3-111
S21 - V.24/General Bit Mapped Options Status....3-112
S210 – V.34 Symbol Rates....3-121
S22 - Speaker/Results Bit Mapped Options Status....3-112
S23 - General Bit Mapped Options Status....3-113
S24 - Sleep Inactivity Timer....3-113
S25 - Delay To DTR Off....3-113
S26 - RTS to CTS Delay....3-113
S27 - Bit Mapped Options Status....3-114
S28 - Bit Mapped Options Status....3-114
S29 - Flash Dial Modifier Time....3-115
S3 - Carriage Return Character....3-106
S30 - Disconnect Inactivity Timer....3-115
S31 - Bit Mapped Options Status....3-115
S36 - LAPM Failure Control....3-116
S38 - Delay Before Forced Hang Up....3-116
S39 - Flow Control Bit Mapped Options Status....3-117
S4 - Line Feed Character....3-106
S40 - General Bit Mapped Options Status....3-117
S41 - General Bit Mapped Options Status....3-118
S46 - Data Compression Control....3-118
S48 - V.42 Negotiation Control....3-118
S5 - Backspace Character....3-107
S6 - Wait Time before Blind Dialing or for Dial Tone....3-107
S7 - Wait Time for Carrier, Silence, or Dial Tone....3-107
S8 - Pause Time For Dial Delay....3-108
S86 - Call Failure Reason Code....3-119
S9 - Carrier Detect Response Time....3-108
S91 - PSTN Transmit Attenuation Level....3-120
S92 - Fax Transmit Attenuation Level....3-120
S95 - Extended Result Codes Control....3-120
–STE= - Set Telephony Extension....3-50

T

T - Set Tone Dial Default....3-40
-TRV – Tip & Ring Voltage....3-55
-TTE - Threshold Adjustments for Telephony Extension....3-56

V

V - Result Code Form....3-18
\V - Single Line Connect Message Enable....3-47

W

W - Connect Message Control....3-18

X

X - Extended Result Codes....3-19

Z

Z - Soft Reset and Restore Profile....3-2

NOTES

www.conexant.com
General Information:
U.S. and Canada: (800) 854-8099
International: (949) 483-6996
Headquarters – Newport Beach
4311 Jamboree Rd.
Newport Beach, CA. 92660-3007